

DEFENDING DEFLATIONARY HEURISTICS
AGAINST HYPERINTENSIONAL
MANOEUVRES

Stephen James Duxbury
Emmanuel College

This dissertation is submitted for the degree of
Doctor of Philosophy

January 2019

Preface

This dissertation is the result of my own work and includes nothing which is the outcome of work done in collaboration except as declared in the Preface and specified in the text.

It is not substantially the same as any that I have submitted, or, is being concurrently submitted for a degree or diploma or other qualification at the University of Cambridge or any other University or similar institution except as declared in the Preface and specified in the text. I further state that no substantial part of my dissertation has already been submitted, or, is being concurrently submitted for any such degree, diploma or other qualification at the University of Cambridge or any other University or similar institution except as declared in the Preface and specified in the text.

It does not exceed the prescribed word limit for the relevant Degree Committee.

Acknowledgements

I wish to express my sincere thanks to Dr Tim Button, for his constant encouragement, guidance and support. I also thank Dr Arif Ahmed for his invaluable advice.

I take this opportunity to record my sincere thanks to Laura Hannan, for her love and support. I also apologise for the many philosophical rants she has had to endure.

I thank my mum, Lesley Duxbury, for her unyielding support, and her strength in difficult times.

I also place on record my sense of gratitude to one and all who, directly or indirectly, have lent their helping hand in this venture.

Finally, I thank my cats Miaomi, Celestine and Sherbert, all of whom have helped unwittingly, and self-servingly.

Contents

Contents	6
I	11
1 Introduction	13
1.1 The Thesis	13
1.2 The Structure of the Thesis	16
1.3 A Concessionary Approach	22
2 Deflationary Metaphysics and Hyperintensional Manoeuvres	25
2.1 Introduction	25
2.2 Merely Verbal Disputes	27
2.3 Introducing Hyperintensional Manoeuvres	33
2.4 Conclusion	37
3 Case Study: Eli Hirsch and the Equivalence Condition	39
3.1 Introduction	39
3.2 The Equivalence Condition	40
3.3 The Equivalence Condition and Quantifier Variance	48
3.4 The Equivalence Condition and Hyperintensional Manoeuvres . .	50
3.5 Conclusion	51
4 Case Study: David Chalmers and the Method of Elimination	53
4.1 Introduction	53
4.2 David Chalmers and the Method of Elimination	53
4.3 Bedrock Disputes	56
4.4 The Method of Elimination and Hyperintensional Manoeuvres .	59

<i>CONTENTS</i>	7
4.5 Conclusion	60
5 Case Study: Amie Thomasson's Easy Ontology	61
5.1 Introduction	61
5.2 Amie Thomasson's Easy Ontology	62
5.3 Easy Ontology and Hyperintensional Manoeuvres	64
5.4 Conclusion	65
II	67
6 Deflationary-Friendly Naturalness	69
6.1 Introduction	69
6.2 Introducing Naturalness	70
6.3 Deflationary-Friendly Naturalness	73
6.4 The Subjectivity of Deflationary-Friendly Naturalness	79
6.5 Conclusion	85
7 Easy Roles for Deflationary-Friendly Naturalness	87
7.1 Introduction	87
7.2 Theoretical Roles for Naturalness	88
7.3 Similarity	89
7.4 Duplication and its Corollaries	90
7.5 Materialism	91
7.6 Conclusion	92
8 The Uniqueness of Ideal Science	95
8.1 Introduction	95
8.2 Complicating Easy Theoretical Roles	96
8.3 No Unique Consensus	98
8.4 No Best-Worlds	104
8.5 Conclusion	108
9 Mental Content	109
9.1 Introduction	109
9.2 Putnam's Permutation Arguments	110

9.3	Putnam's Permutation Argument and Deflationary-Friendly Naturalness	113
9.4	Problems with Lewis's Response to Putnam	114
9.5	Kripke's Rule-Following Paradox	120
9.6	Kripke's Rule-Following Paradox and Deflationary-Friendly Naturalness	121
9.7	Problems with Lewis's Response to Kripke	122
9.8	Conclusion	124
10	Lawhood	125
10.1	Introduction	125
10.2	The Best Systems Analysis	126
10.3	Law of Nature and Deflationary-Friendly Naturalness	128
10.4	Woodward and Simplicity	130
10.5	Extending Woodward's Argument	133
10.6	An Objection to Woodward's Argument	135
10.7	Consequences and Conclusions	136
11	Relative Naturalness	137
11.1	Introduction	137
11.2	Epistemological Availability	140
11.3	Precisifying Vagueness	141
11.4	Infinite Complexity	143
11.5	Partial Ordering	147
11.6	Variably Natural, Fixedly Complex	153
11.7	Primitive Relative Naturalness?	155
11.8	Conclusion	157
III		159
12	Grounding	161
12.1	Introduction	161
12.2	The Basics of Grounding	162
12.3	The Grammar of Ground	163
12.4	The Relational Properties of Ground	165
12.5	Some Important Definitions	166

12.6 Conclusion	166
13 The Ground-Naturalness Connection	167
13.1 Introduction	167
13.2 The Ground-Naturalness Connection	168
13.3 Natural Translations and Grounding	169
13.4 Deflationary-Friendly Naturalness	171
13.5 Deriving all Grounding Claims from the Natural Grounding Claims	172
13.6 Conclusion	181
14 Conceptual Links	183
14.1 Introduction	183
14.2 From Right to Left	183
14.3 From Left to Right	185
14.4 Conclusion	191
15 Paradigmatic Examples of Grounding	193
15.1 Introduction	193
15.2 Testing the Biconditional	194
15.3 Example Schemes 1-6: Multiple Realisability	196
15.4 Example Schemes 7 & 8: Some Easy Cases	203
15.5 Example Schema 9: Laws and Illegality	206
15.6 Example Schema 10: A Puzzle for Ground	209
15.7 Example Schema 11: Simples, Complexes and Existence	216
15.8 Example Schema 12: Set-Theoretic Grounding	220
15.9 Conclusion	223
16 Theoretical Applications of Grounding	225
16.1 Introduction	225
16.2 Characterising Fundamentality	226
16.3 Characterising Intrinsicity	227
16.4 Characterising Physicalism	230
16.5 Characterising Three-Dimensionalist and Four-Dimensionalist Po- sitions	231
16.6 Conclusion	233
17 Small-g Relations	235

17.1	Introduction	235
17.2	The Small-g Relation Objection	235
17.3	Small-g Relation Objections and the Ground-Naturalness Con- nection	238
17.4	Conclusion	239
18	Conclusion	241
	Bibliography	245

Part I

Chapter 1

Introduction

1.1 The Thesis

This thesis aims to defend deflationary heuristics against hyperintensional manoeuvres.

A deflationary heuristic is a method for determining whether a given dispute is deflatable. There is a contemporary interest in these deflationary methodologies. For example, Hirsch (2009, 2016) sets out conditions for when a dispute is merely verbal. The thought is that some persisting, metaphysical disputes can be given deflationary treatment, thus ending otherwise intractable disputes. By way of example, we might believe that a metaphysical dispute over whether tables exist is merely verbal. A commonsense mereologist will affirm that tables exist. Meanwhile, a mereological nihilist might argue that tables don't exist, but concede that there do exist atoms arranged tablewise. We might think that this dispute is merely verbal, because the two disputants mean something different by 'table'. The commonsense mereologist takes 'there exist tables' to be synonymous with 'there exist atoms arranged tablewise', whilst the mereological nihilist does not take the two phrases to be synonymous.

Hyperintensional manoeuvres are utilised by the substantivist to avoid a dispute otherwise being found to be deflatable. The basic thought is that deflationary heuristics often work by finding complete agreement between the disputants on any relevant, extensional or intensional fact. Hyperintensional manoeuvres appeal to relevant, *hyperintensional* facts over which the disputants disagree. Having reformulated the dispute over these hyperintensional facts,

the substantivity of the dispute is preserved. We can demonstrate this with the example of the dispute over whether tables exist. The substantivist makes a hyperintensional manoeuvre and insists that the disputants disagree over whether the fact that there exist tables is *metaphysically dependent* on the fact that there exist atoms arranged tablewise. They disagree over whether the fact that there are atoms arranged tablewise is more *fundamental* than the fact that there exist tables.

I seek to provide a response for deflationists against hyperintensional manoeuvres. My strategy is as follows. I consider variants of hyperintensional manoeuvre, characterised by how fundamentality is analysed. For example, we might think that a property is more fundamental than another iff it is more *natural*. Applying this notion of fundamentality in a hyperintensional manoeuvre is then a *naturalness-variant* of hyperintensional manoeuvre. Meanwhile, we might think that a fact is more fundamental than another iff the former *grounds* the latter, or the former is ungrounded, and the latter is not. Applying this notion of fundamentality in a hyperintensional manoeuvre is then a *grounding-variant* of hyperintensional manoeuvre.

From there, I focus on those hyperintensional concepts that underpin these variants of hyperintensional manoeuvre. In this thesis, I focus on naturalness and grounding. I seek to argue that the correct interpretations of naturalness and grounding are *deflationary-friendly*. The thought is that the correct interpretation of naturalness is such that it is subjective and interest-relative whether a property is perfectly natural. Analogously, the idea is that the correct interpretation of grounding is such that it is subjective and interest-relative whether a fact grounds another.

Suppose that I offer the correct interpretations of these notions. The deflationary-friendliness of these notions should ‘push through’ to fundamentality through these various analyses of fundamentality. Hence, it becomes a subjective and interest-relative matter whether one property or fact is more fundamental than another. The thought is that there is nothing more to such debates other than the interests of the disputants, confusions about meanings of words, and other similar issues.¹

¹I resist the thought that we should offer precise *definitions* of ‘subjective’, ‘pragmatic’ and ‘interest-relative’ in this thesis. This is because precise definitions will probably contain controversial implications about which disputes are subjective, pragmatic and interest-relative. Rather than this settling the issue, substantivists will challenge the definitions,

This defangs hyperintensional manoeuvres. If it is subjective and interest-relative whether one property or fact is more fundamental than another, then it is only of pragmatic significance whether one side in the dispute uses more fundamental concepts. Nothing objective rests on settling who is thinking in fundamental terms. Hyperintensional manoeuvres therefore reformulate metaphysical disputes into *pragmatic* disputes. Intuitively, this does not preserve the substantivity of the original dispute, and hyperintensional manoeuvres therefore serve to *deflate* the disputes further.

I defend deflationary heuristics, then, if I can show that the correct interpretations of naturalness and grounding are deflationary-friendly. My argument is as follows. Deflationary-unfriendly interpretations of naturalness commit naturalness theorists to substantive, metaphysical theories about the structure of objective reality. The thought is that this incurs some kind of *cost* for the naturalness-theorist. This cost might be justified by the benefits that positing naturalness can deliver. Naturalness has a wide variety of useful, theoretical applications. On the other hand, if these theoretical applications are available *more cheaply* under deflationary-friendly interpretations, then a plausible cost-benefit analysis favours deflationary-friendly interpretations of naturalness.

My deflationary-friendly interpretation of naturalness does not commit naturalness theorists to claims about the structure of objective reality. It therefore avoids the associated costs. Consequently, if it allows naturalness to play the same theoretical roles, then it enjoys the same benefits as alternative interpretations, but more cheaply. I argue that my deflationary-friendly naturalness can play all of the same theoretical roles that were otherwise *successful*. My deflationary-friendly naturalness is incompatible with certain theoretical applications of naturalness, but I argue that these applications are unsuccessful for *any* interpretation of naturalness. Given that these applications are unsuccessful under any interpretation of naturalness, rivals to deflationary-friendly interpretations do not enjoy any benefits over the deflationary-friendly inter-

and we will end up more confused than when we started. To take a toy example, suppose that we defined an ‘interest-relative dispute’ as one that some disputants find interesting. This would imply that disputes over the existence of free will are interest-relative. However, the substantivist should not accept this conclusion, but instead challenge the definition of ‘interest-relative dispute’ that led to this conclusion.

I contend that it is better to keep these terms as neutral as possible, at the risk of some vagueness. The hope is that this allows a common framework for talking about whether disputes are substantive or deflatable.

See §2.2 for a related discussion about definitions of ‘deflatable’.

pretation. I then appeal to my cost-benefit analysis, which plausibly favours my deflationary-friendly interpretation.

To argue that the correct interpretation of grounding is deflationary-friendly, I find conceptual links between grounding and naturalness. The thought is that a given grounding claim is true iff certain claims involving naturalness are true. By this conceptual link, the deflationary-friendliness of naturalness pushes through to grounding, such that grounding is shown to be deflationary-friendly.

I therefore argue that the correct interpretations of naturalness and grounding are deflationary-friendly. This pushes through to their analyses of fundamentality. This defangs naturalness-variants and grounding-variants of hyperintensional manoeuvre. I thus defend deflationary heuristics from hyperintensional manoeuvres.

1.2 The Structure of the Thesis

In §1.1, I presented the argument of the thesis. This section presents the structure that the argument takes.

The thesis is divided into three Parts. Part 1 introduces the deflationary heuristics I want to defend, and the hyperintensional manoeuvres that threaten them. It therefore sets up the motivation for the thesis. Part 2 considers naturalness, and seeks to demonstrate that the correct interpretation of naturalness is deflationary-friendly. Part 3 turns to grounding, and seeks to demonstrate a conceptual link between grounding and naturalness: by which grounding is shown to be deflationary-friendly.

Part 1

Part 1 consists of ch.1-ch.5. Ch.1 is this chapter. It presents the main argument of the thesis, and describes the structure of the chapters.

Meanwhile, ch.2 presents the deflationary ideas underpinning the deflationary heuristics I want to defend. It also presents the general form of hyperintensional manoeuvres that threaten them: that hyperintensional manoeuvres find disagreement over relevant, hyperintensional facts in a dispute.

I defend the idea that we are looking for *heuristics*, rather than *analyses* of unsubstantivity. I believe that deep analyses of unsubstantivity have two

main flaws. Firstly, they give a global analysis of what is a relevant fact in a dispute. This is problematic, as whether a fact is relevant is intuitively local to the dispute in question. Secondly, deep analyses of unsubstantivity seek to make controversial judgements on which disputes are deflatable. This is problematic, as it builds controversy into the analysis itself. Instead, I propose that we are better off with shallow analyses of unsubstantivity. These render it intuitive what an deflatable dispute is. From there, we can present deflationary heuristics for arguing that a dispute is merely verbal. These heuristics are designed to persuade someone neutral to the issue, but can admit of exceptions.

I detail three deflationary heuristics, across ch.3-ch.5. In ch.3, I consider Hirsch's (2016) Equivalence Condition heuristic. This sets out conditions under which two disputants might recognise the other to be speaking the truth in their respective languages. I distance the Equivalence Condition heuristic from the thesis of quantifier variance, as commitment to one does not force commitment to the other. The second heuristic is Chalmers's (2009, 2011) method of elimination, which is the subject of ch.4. This bans a key term from the dispute, to see if the dispute can be preserved without it. If it cannot, then the thought is that there is something wrong with the term that is banned – for example, the disputants may be using it differently and speaking past one another. I find conflict between the method of elimination and Chalmers's notion of a bedrock dispute, and argue that we should reject the latter. The third and final heuristic is given by Thomasson's (2009, 2016) easy approach to ontology, considered in ch.5. This associates noun-phrases with application conditions, that can be straightforwardly tested to see if they obtain. This can render ontological questions trivial – when asking whether X exists, we find the application conditions for ' X ' and then see if those conditions obtain.

In each of these chapters, I show how these deflationary heuristics are threatened by hyperintensional manoeuvres. These are typically naturalness-variants of hyperintensional manoeuvre. However, I make the case that grounding-variants represent just as much a threat to these deflationary heuristics.

Having explicated the deflationary heuristics and the hyperintensional manoeuvres that threaten them, I establish what is at stake. The rest of the thesis turns to defending those deflationary heuristics from this threat.

Part 2

Part 2 consists of ch.6-ch.11. It considers naturalness, and argues that the correct interpretation of naturalness is deflationary-friendly.

In ch.6, I introduce the basic idea of Lewis's (1983) naturalness. I provide some basic examples of naturalness and provide some grammatical details. Furthermore, I present my deflationary-friendly interpretation of naturalness, which is as follows:

Deflationary-Friendly Naturalness: Property α is *perfectly natural* iff α is a property referred to by a primitive predicate in the language of ideal science.

The rest of the chapter explains what is meant by 'ideal science'. The basic thought is that ideal science is a complete science adopted by scientists, in the closest world (subject to some restrictions on the accessibility relation) to our own where a complete science is discovered. It is ideal in the sense that it is complete and may not be discovered in the actual world, rather than in the sense that it involves ideal, epistemic agents. As such, the languages of ideal science may be subject to interest-relative and accidental factors. I defend the idea that Deflationary-Friendly Naturalness avoids the costs associated with deflationary-unfriendly interpretations: which commit the naturalness-theorist to claims about the structure of objective reality. This sets up Deflationary-Friendly Naturalness as 'cheaper' than its rivals.

In ch.7, I turn to the task of demonstrating that Deflationary-Friendly Naturalness enjoys the same benefits as its rivals. Naturalness plays a variety of theoretical roles. For example, it is used to analyse duplication, which in turn is used to analyse a variety of important, philosophical concepts. I present these applications and argue that Deflationary-Friendly Naturalness is compatible with these theoretical roles. This makes plausible a cost-benefit analysis that favours Deflationary-Friendly Naturalness, because it shows that the interpretation enjoys many of the same benefits as its rivals, but without the costs associated with those rivals.

Throughout ch.6 and ch.7, I make the assumption that there is a unique, ideal science. Ch.8 considers this assumption in more detail. I argue that there may not be a unique, ideal science, depending on which worlds are closest to our own. This complicates the cost-benefit analysis that favours

Deflationary-Friendly Naturalness. However, I argue that Lewis's deflationary-unfriendly interpretation is also compromised by analogous assumptions about which worlds are closest to our own. I demonstrate that my Deflationary-Friendly Naturalness does *as well as* Lewis's deflationary-unfriendly interpretation across different scenarios regarding which worlds are closest. This means that Deflationary-Friendly Naturalness continues to enjoy the same benefits as its rivals, protecting my cost-benefit analysis in its favour.

Next, I consider the remaining theoretical roles for naturalness. These prove more challenging than those discussed in ch.7. In ch.9, I consider naturalness's role of restricting mental content. Lewis (1983) applies naturalness to meeting Putnam's (1981) permutation arguments and Kripke's (1982) rule-following paradox. Deflationary-Friendly Naturalness is incompatible with these applications. In brief, this is because it renders naturalness relative to the theories of ideal science. However, I argue that any interpretation of naturalness fails in this theoretical application. I defend both Putnam's permutation arguments, and Kripke's rule-following paradox, from appeals to naturalness. The thought is that Lewis misapprehends the scope or context of these arguments, and that the appeal to naturalness is either inappropriate to these contexts, unexplanatory, or redundant. I draw heavily from the arguments of Button (2013) and Merino-Rajme (2015).

In ch.10, I turn to naturalness's theoretical role in analysing what it is to be a law of nature. Deflationary-Friendly Naturalness is incompatible with this role, again because it renders naturalness theory-relative. Once more, I argue that any interpretation of naturalness fails to analyse lawhood successfully. I outline Lewis's Best Systems Analysis (BSA). I expand on Woodward's (2014) arguments against the scientific credentials of the BSA. The basic idea is that the notions appealed to by Lewis – simplicity and theoretical strength – admit of scientific justifications in the context of scientific, theory choice. However, these justifications are inapplicable in the context of *best* theory choice. Hence, Lewis's use of them is unscientific, and unsuited for analysing lawhood as used by scientists.

By demonstrating that these theoretical roles are unsuccessful on any interpretation of naturalness, I defend my cost-benefit analysis. These theoretical roles – because they are unsuccessful – fail to confer any theoretical benefit to deflationary-unfriendly interpretations of naturalness. Hence, my Deflationary-

Friendly Naturalness continues to enjoy the same benefits as its rivals (but more cheaply).

Finally, I discuss difficulties in analysing relative naturalness in ch.11. Lewis (1983) seeks to analyse relative naturalness in terms of the complexity of the perfectly natural definitions of properties. This runs into a variety of issues regarding how complexity is to be measured. If it is measured by number of definitional parts, then this means that properties of infinite definitional complexity are all equally natural. This has counterintuitive results. I suggest that we measure complexity by the relative size of appropriate sets or construction trees. I provide detail on how this can be done without rendering relative naturalness too partial an ordering on sets. My goal is to defend something like Lewis's analysis of relative naturalness. Regardless, I stress that the problem is not a special one for Deflationary-Friendly Naturalness: it is a problem for any interpretation of naturalness. This chapter is therefore conciliatory towards naturalness-theorists, under any interpretation.

Part 2 defends a deflationary-friendly interpretation of naturalness. It therefore provides the deflationist with a defence against naturalness-variants of hyperintensional manoeuvre.

Part 3

Part 3 consists of ch.12-ch.18. It considers grounding, and seeks to defend a conceptual link between grounding and naturalness. Combining this result with the result of Part 2, it provides a deflationary-friendly interpretation of grounding.

In ch.12, I introduce the notion of metaphysical grounding. I note its link with the 'in virtue of' locution, and give some detail about its grammar and relational properties. There is some controversy on the nature of grounding within the grounding literature, but I assume that it constitutes a partial ordering on facts. This means that it is irreflexive, asymmetric and transitive. I also detail some distinctions within the concept of grounding. For example, I outline Fine's (2012) notion of weak (as opposed to strict) grounding, as well as the more familiar notion of partial grounding.

In ch.13, I present the conceptual link between grounding and naturalness that I want to defend (when Δ is a set of sentences, ϕ is a sentence, and ' $\Delta < \phi$ ' is synonymous with ' Δ grounds ϕ '):

Ground-Naturalness Connection: $\Delta < \phi$ iff there is a $<$ -derivation from the set of natural grounding claims to ' $\Delta < \phi$ '.

The chapter seeks to explain the key notions involved in the Ground-Naturalness Connection. I explain what is meant by a natural grounding claim, such that

Natural Grounding Definition: Δ naturally grounds ϕ iff there is a $<$ -derivation of ' $\Lambda < \gamma$ ', when Λ is a set of perfectly natural translations of the sentences in Δ , and γ is some perfectly natural translation of ϕ .

This requires further explication of what a perfectly natural translation is. Additionally, I need to set out what is meant by $<$ -derivation. Ch.13 handles both tasks. In brief, a perfectly natural translation is a translation of an English sentence into Naturalish – a language whose predicates all refer to perfectly natural properties. Meanwhile, $<$ -derivation is captured by some infinitary rules designed to reflect the logical behaviour of grounding. I provide full detail on both of these notions, such that the Ground-Naturalness Connection is fully explained. I also explain how we can help ourselves to our specific deductive rules without committing ourselves to a deflationary-unfriendly notion of logical grounding.

The rest of Part 3 seeks to *defend* the Ground-Naturalness Connection. In ch.14, I consider conceptual arguments for the link between naturalness and grounding. I argue that the right-to-left direction of the biconditional is provable from assumptions that the grounding theorist should accept. The basic thought is that our specific natural deduction rules should be acceptable to grounding theorists. Hence, whenever it delivers a grounding claim, grounding theorists should accept that claim. From there, I appeal to the idea that perfectly natural translations of English sentences express the same fact, and that grounding holds between facts. Hence, if the grounding theorist accepts a grounding claim in Naturalish, they should be willing to accept the corresponding grounding claim in English.

Meanwhile, I offer an argument in defence of the left-to-right direction. The basic idea is that grounding can be 'constructed' out of a restricted, supervenience relation – one that preserves relevancy between facts and the correct direction of relative fundamentality. I argue that this relation is precisely what

is offered by the Ground-Naturalness Connection, such that we can construct grounding out of naturalness and our specific natural deduction rules.

Later chapters continue to evidence the left-to-right direction of the Ground-Naturalness Connection. In ch.15, I consider paradigmatic examples of grounding. I argue that each of them vindicates something like the Ground-Naturalness Connection. By this, I mean that each paradigmatic instance of grounding ' $\Delta < \phi$ ' should be such that there is a $<$ -derivation from the set of natural grounding claims to ' $\Delta < \phi$ '. Some of these instances straightforwardly vindicate the Ground-Naturalness Connection, but others call for modification. These modifications, however, are in the spirit of the Ground-Naturalness Connection, such that they preserve the deflationary-friendliness of grounding.

My final defence of the Ground-Naturalness Connection comes in ch.16. I consider theoretical applications for grounding and show that successful roles are compatible with the Ground-Naturalness Connection. For example, the biconditional is compatible with analysing fundamentality, intrinsicity, materialism and certain three-dimensionalist positions in terms of grounding. This offers further support for the Ground-Naturalness Connection, by which grounding is rendered deflationary-friendly.

Ch.17 is a small chapter considering the 'small-g relation' objection to grounding, presented by Koslicki (2014) and Wilson (2014). They argue that grounding is an unnatural disjunction of small-g relations, and that there is no metaphysical kind corresponding to grounding itself. This is broadly supportive of my project, because it strengthens support for deflationary-friendly interpretations of grounding, and undermines grounding-variants of hyperintensional manoeuvre. In the chapter, I consider the arguments surrounding the small-g relation objection, and note how they interact with my thesis.

Finally, ch.18 concludes the thesis. It assesses what has been achieved, and quickly summarises the main points that I have argued.

1.3 A Concessionary Approach

To conclude this chapter, I want to make some brief remarks on the methodological principles I follow in this thesis.

Naturalness, grounding and fundamentality are difficult and controversial notions. Some philosophers are inclined to reject them out of hand as confused

or obscure. For example, Hofweber (2009) argues that grounding is too mysterious, whilst Oliver (1996, 48) complains that ‘we know we are in the realm of murky metaphysics by the presence of the weasel words ‘in virtue of’’. Taylor (1993) criticises naturalness for its obscure appeal to carving at the joints of nature.

Simply rejecting hyperintensional, metaphysical primitives like these offer an alternative defence to the deflationist. When the substantivist makes a hyperintensional manoeuvre, the deflationist might respond that she doesn’t know what it *means* for one notion of free will to be more fundamental. Indeed, Chalmers (2011) makes this explicit response.

I don’t adopt these kinds of argument in this thesis. This is for a number of reasons. The primary reason is that it is unnecessarily standoffish. Simply rejecting these primitives as meaningless creates an immediate, argumentative impasse between the deflationist and the substantivist. More importantly, it does little to convince the neutral observer who has not yet decided whether a dispute is substantive. My thesis targets such a neutral observer, who is not convinced by seriously metaphysical primitives, but open to them.

I am therefore happy to concede to the substantivist that these primitives are meaningful. I believe that this strengthens the argument of my thesis. By adopting a concessionary approach, there is less room for the substantivist to resist my conclusions. If successful, my arguments show that these primitives are deflationary-friendly *by the substantivist’s own lights*. I accept that these primitives play useful, theoretical roles, but demonstrate that my interpretations allow them to play those roles more cheaply.

Finally, I am not convinced that wholesale rejections of metaphysical primitives are particularly persuasive. More and more work is being done on these metaphysical primitives, seeking to elucidate and explain what they amount to. Metaphysicians are finding conceptual links between their primitives, applying them to theoretical roles, and finding increasing agreement on examples. This precisifying work will only continue, until some kind of consensus will have formed. At this point, it is not clear to me how we can justifiably claim that these notions are meaningless – entire schools of thought seem able to use them with consistency. Though this consensus may not yet have been achieved, there is no obvious reason to be pessimistic about their future. As metaphysicians continue to work with their notions, they will become more precise. Reject-

ing these primitives wholesale threatens to be increasingly unpersuasive as this work continues.

I therefore avoid wholesale rejections of metaphysical primitives. My thesis defends the deflationist from *within* the substantivist's camp. I now turn to delivering on that project.

Chapter 2

Deflationary Metaphysics and Hyperintensional Manoeuvres

2.1 Introduction

This chapter provides the context for this thesis. First, I introduce the idea of merely verbal disputes, and deflationary heuristics that are used for arguing that some metaphysical disputes are deflatable. It is these heuristics that I want to defend in this thesis. Second, I introduce the notion of hyperintensional manoeuvres that I defend deflationary heuristics against.

Modern deflationism is heavily influenced by the work of Carnap (1950). Carnap is concerned with showing that talk of numbers, propositions, properties and other abstract objects is consistent with empiricist scruples. For example, he argues that the existence of numbers follows analytically from non-controversial claims such as ‘3 is a prime number’. If 3 is a prime number, then 3 is a number and there is something that is 3: hence, there are numbers.

Carnap recognises that the triviality of this reasoning renders incomprehensible the dispute between Platonists and nominalists of his day. He therefore makes a distinction between two kinds of ontological question, relative to a *framework*. How frameworks are to be understood is contentious, but Eklund (2016) argues that they are best seen as conceptual worldviews.¹

The first kind of ontological question is *internal* to the framework, and

¹An alternative notion of framework is given by Thomasson (2009, 2016) in terms of the use/mention distinction. See §5.2 for further discussion.

allows for trivial reasoning as just described. The second is *external* to the framework. Carnap suggests that external questions are questions about what should be accepted into the framework. These questions are pragmatic, turning on the interests of the disputants.

Carnap took this to be an interpretation of the Platonist/nominalist dispute which gives the dispute some content. If the claim ‘there exist numbers’ is internal to the framework, then it follows trivially from claims such as ‘3 is a prime number’. Given the Platonist and the nominalist do not think that their dispute is trivial, we cannot interpret ‘there exist numbers’ as internal. However, if the claim is external to the framework, then it lacks factual content. Interpreting the dispute as pragmatic avoids the dispute from being nonsense.

As Button (2016), Eklund (2016) and Sidelle (2016) have identified, modern deflationism is influenced but distinct from Carnap’s metaontology. Button highlights at least three vectors of dissimilarity. The first is a matter of scope. As Button (2016) puts it, ‘Carnap’s internal/external dichotomy will allow us to brush aside almost all of metaphysics. Neo-Carnapians tend to focus on more specific disputes’. The second is a matter of formality. Button notes that Carnap wants to explicate informal talk using some formal framework, such that some questions can be internal to that framework. Modern deflationists, if they speak of frameworks at all, rarely assume that they are formalised. The third is a matter of empiricism. Carnap is a devoted empiricist, whilst modern deflationists scarcely mention empiricism at all.

Nonetheless, modern deflationists are influenced by Carnap. In the next three chapters, I consider the deflationary methodologies of Hirsch (§3.2), Chalmers (§4.2) and Thomasson (§5.2). Of these, it is perhaps Thomasson (2009, 2015, 2016) who has the best claim to neo-Carnapianism: explicitly working with frameworks and interpreting them in terms of the use/mention distinction. This is not to suggest, however, that there are no Carnapian influences operative in Hirsch and Chalmers.

In §2.2, I expand on the idea of a merely verbal dispute and defend my analysis as properly *shallow*. This is because deeper analyses of mere verballity invite counterexamples (as they are too global) and controversy (because it is often controversial whether a philosophical dispute is merely verbal). In §2.3, I introduce the general notion of a hyperintensional manoeuvre. In the next three chapters, we see that variants of hyperintensional manoeuvre threaten

some prominent deflationary heuristics.

2.2 Merely Verbal Disputes

Intuitively, some disputes are merely verbal rather than substantive. Rather than turning on a factual matter, they are instead based on implicit disagreement over the meaning of key expressions. Moreover, the idea that a dispute can be merely verbal is not an invention of philosophy – not a philosophical posit of Hirsch (2009) or some other deflationist. Instead, it is a pre-theoretical concept with extensive application and clear utility.

To demonstrate that the concept has a wealth of pre-philosophical application, consider a few examples. Suppose that persons *A* and *B* disagree over the truth value of the sentence ‘Hilary Clinton’s policies are right wing’. *A* is American, whilst *B* is European. Both *A* and *B* are fully informed on Clinton’s range of policies, and informed on the political mainstream of both America and Europe. Intuitively, they do not disagree on any relevant fact, but just mean different things by ‘right wing’. *A*, being American, uses ‘right wing’ to mean ‘right of the American political centre’, and correctly argues that Clinton’s policies are not right wing. *B*, being European, uses ‘right wing’ to mean ‘right of the European political centre’, and correctly argues that Clinton’s policies are right wing. Their dispute is merely verbal.

Another example is as follows. Claire has been working until 7pm for the last week. Persons *C* and *D* disagree over the truth value of the sentence ‘Claire has been working late this week.’ *C* asserts that the sentence is true, whilst *D*, remembering themselves having worked until 9pm for the last month, retorts that the sentence is false. Suppose further that *C* and *D* are fully informed as to Claire’s actual work hours, her work hours according to her work contract, and so on. Again, it is intuitive that *C* and *D* do not disagree on any relevant fact, and are engaged in a merely verbal dispute due to disagreement over the meaning of ‘working late’.

These two examples are intended only as illustrative. I am confident that the reader could supply many non-philosophical examples. The phenomenon of merely verbal dispute is ubiquitous.

The two examples also demonstrate some important features of merely verbal disputes. Firstly, as Chalmers (2011) notes, merely verbal disputes need

not be *unimportant*. Though it may be merely verbal whether or not Clinton's policies are right wing, an opinionated resolution to the dispute may influence how Americans vote. Moreover, merely verbal disputes may offer insight into the use of our concepts. Though it may be merely verbal whether or not Claire is working late, societal attitudes regarding what it means to work late may shape our attitudes regarding the proper balance of work and personal life.

Sometimes merely verbal disputes can have legal significance. A 1991 court heard on whether or not Jaffa Cakes were cakes. There was no disagreement over the composition of Jaffa Cakes, how they are made or how they are marketed. Intuitively, it was merely verbal whether or not Jaffa Cakes are cakes, turning on disagreement over the meaning of 'cake'. Nonetheless, it was of great importance to determine an answer to the question – deciding whether or not Jaffa Cakes would be taxed as cakes or biscuits.

Consequently, it is not that merely verbal disputes do not matter, but rather that the matter turns on a linguistic disagreement. This, of course, may sometimes serve to deflate a dispute as unimportant. We use the word 'merely' because often such disputes were *supposed* to turn on some relevant, non-linguistic fact. This is typically the case when considering *philosophical* applications of mere verballity. The dispute over whether personal identity consists in psychological continuity is *supposed* to be non-linguistic, turning on non-linguistic facts about the world. Finding that the dispute was *merely* verbal would undermine the interest philosophers have in it.

Just as not all merely verbal disputes are unimportant, not all merely verbal disputes should be neutrally resolved. Hirsch (2009) notes that, insofar as both sides purport to speak ordinary English, one disputant may be mistaken. Suppose that persons *E* and *F* look up at a clear sky and disagree over the truth value of the sentence 'it is cloudy'. Suppose that neither *E* nor *F* have committed any basic, perceptual error, but that *F* thinks that 'cloudy' means what we might communicate by 'clear'. Though the dispute is merely verbal, there is an intuitive sense in which *F* has *made a mistake*. We operate on the presumption that both *E* and *F* are attempting to speak ordinary English, and *F* has used ordinary English incorrectly. Hence, resolving their merely verbal dispute might involve *F* accepting that they were mistaken.

Chalmers (2011) gives another example where one side may be wrong in a merely verbal dispute. Suppose that Sue made a false statement that she

did not believe to be false. Persons *G* and *H* agree on this, and also agree as to the moral status of Sue's assertion. However, they initially disagree over the truth value of 'Sue lied', with *G* denying the sentence and *H* affirming the sentence. *H* affirms the sentence because they use the term 'lied' without reflection, initially acting as though 'lie' refers to any false statement. However, throughout the course of the dispute, *H* reflects on their use of 'lie' and comes to accept that Sue did not lie. Chalmers suggests that their dispute is merely verbal, but notes that the dispute is resolved by *H* accepting that they made a mistake.

Hence, disputants in merely verbal disputes can retract their positions, and with good reason. What makes the dispute merely verbal is not that it should be neutrally resolved, but that the dispute rests only on linguistic disagreement, when it was supposed to turn on non-linguistic facts.

With this in mind, we start with the following analysis of an *deflatable* dispute:

A dispute is *deflatable* iff the disputants do not disagree on any relevant fact.

However, this analysis does not quite fit our purpose. Suppose that the disputants disagree such that one asserts '*p*' and the other asserts 'not-*p*'. Suppose further that there is no fact of the matter about whether *p*. It is plausible that the two disputants are both *substantively* wrong: that they should conclude 'it is indeterminate whether *p*'.

The lesson is that our analysis is problematic if we allow for indeterminate existence. The solution is to employ a caveat excluding such cases:

A dispute – in which worldly indeterminacy is not a live option – is *deflatable* iff the disputants do not disagree on any relevant fact.

I adopt this approach because the disputes I have in mind for this thesis are those in which worldly indeterminacy is not a live option. Deflationists want to deflate mereological disputes such as whether complexes exist, or whether persons survive bizarre mind-machine cases.² Typically, substantivists in such disputes think that there are determinate facts that settle the dispute. Furthermore, deflationists are normally more concerned with whether there is merely

²See §2.2.

linguistic disagreement at play, rather than if there is genuine, metaphysical indeterminacy in whether a person survives or a complex exists. With this in mind, we might think that the caveat boils away to nothing in the present context.

I then propose that merely verbal dispute are a *species* of deflatable dispute, such that

A dispute is *merely verbal* iff the dispute is deflatable and arises solely in virtue of linguistic disagreement.

An important feature of this analysis is that it does not decide which disputes are merely verbal. It can be contentious whether the disputants disagree on any relevant fact. There may be disagreement over which facts are *relevant* to the dispute. Furthermore, there may be disagreement over whether some facts – relevant or not – obtain, and thus *exist*. It is useful to pause on this point, and provide an example of each. To do so, some set-up is required.

Consider a dispute over the nature of personal identity. A Neo-Lockean argues that personal identity consists in psychological continuity.³ Hence, *B* is the same person as *A* iff *B* is psychologically continuous with *A*. Meanwhile, an Olsonian (1997) argues that personal identity consists in biological continuity. Hence, *B* is the same person as *A* iff *B* is biologically continuous with *A*.

The Neo-Lockean and the Olsonian agree on most everyday cases of personal identity. Both can agree that you are identical with the person associated with your body two years ago, for example. However, they disagree on a variety of more unusual cases. For example, suppose that scientists construct a ‘mind-machine’, that can ‘read’ the data of a brain, store that data, and then ‘download’ that data onto another (otherwise ‘empty’) brain. Person *A* plugs into the mind-machine. At this point, *A*-body is destroyed in its entirety. Another body, *B*-body, is brought in. The data on the mind-machine is downloaded onto *B*-brain, which is otherwise empty. The question is what happens to *A* in this procedure.

The Neo-Lockean would say that *A* survives the procedure. This is because the person in *B*-body is psychologically continuous with *A*. The Olsonian would say that *A* does not survive the procedure. The person in *B*-body has no biological continuity with *A*.

³See Noonan (1989) for a survey of Neo-Lockeanism.

Suppose (contra to fact, but for sake of example) that the Neo-Lockean and the Olsonian make the same judgements about when one person is identical to another, *apart from in mind-machine cases*. Whether or not their dispute is deflatable depends on whether there are facts about mind-machine cases that are relevant to the dispute.

We can imagine two arguments against the dispute. The first argument is that facts about whether *A* survives mind-machine cases are irrelevant to the dispute on personal identity. We can imagine a philosopher who argues that mind-machine cases are metaphysically possible, but physically impossible. They might add that facts about what would happen in physically impossible scenarios are irrelevant to *actual* personal identity – that is, what personal identity amounts to in the actual world. Hence, they argue that facts about whether *A* survives mind-machine cases are irrelevant to the dispute. On this basis, they say that the dispute is deflatable.

The second argument holds that mind-machine cases are metaphysically impossible. For example, Van Inwagen (2001) complains that these kinds of thought-experiment are wildly unrealistic. It follows that there are no facts about whether *A* would survive the mind-machine procedure.⁴ Hence, we can argue that there are no facts about whether *A* survives mind-machine cases. On this basis, we say that the dispute is deflatable.

These arguments, however, are controversial. We can imagine them being challenged by philosophers of personal identity. What this demonstrates is that my analysis alone cannot decide which disputes are deflatable.

On the other hand, my analysis is enough to identify paradigmatic cases of merely verbal disputes. We can intuitively see that *A* and *B* do not disagree on any fact relevant to whether Hilary Clinton's policies are right wing. In short, my analysis correctly picks out non-controversial cases of merely verbal dispute, and remains silent on controversial cases.

I propose that this is desirable. This is for largely two reasons. The first is

⁴Or too many facts, depending on our view of counterfactuals with metaphysically impossible antecedents. Williamson (2008) defends the view that counterfactuals with impossible antecedents are trivially true. Hence, it is true that *A* would survive a mind-machine procedure and true that *A* would not survive a mind-machine procedure. If these truths correspond to facts, then we have too many (contradictory) facts to be able to resolve the dispute. In such a situation, it is intuitive that the dispute should be abandoned as deflatable.

Williamson's view of counterfactuals with impossible antecedents is challenged by Wilson (2016). Indeed, Wilson argues that grounding theorists *require* an alternative view of such counterfactuals.

the acknowledgement that one philosopher's *modus ponens* is another's *modus tollens*. Suppose that we have a dispute that many philosophers take to be substantive. For example, consider the dispute between free will compatibilists and incompatibilists. The compatibilist argues that free will is compatible with determinism, and the incompatibilist argues that free will and determinism are incompatible. Some philosophers⁵ may argue that the dispute is merely verbal. Perhaps this result falls out their analysis of 'merely verbal'. In response, a philosopher who thought the dispute was substantive will take this result as evidence that the analysis of 'mere verballity' is flawed.

My point is that any analysis of 'mere verballity' that makes controversial judgements about which disputes are merely verbal will itself be a controversial analysis. Any such analysis is therefore an *opinionated* one, which is unhelpful when seeking to clarify the basic notion behind mere verballity. It is better to have a non-controversial analysis to pin down the notion of a merely verbal dispute, and then present local arguments as to whether a given dispute is merely verbal. To smuggle such judgements into the analysis only serves to obfuscate what is at issue.

What I mean by this is the following. It is more methodologically fruitful to start with agreement on what an deflatable dispute is. This is because it allows philosophers to identify precisely where they disagree. Consider again the Neo-Lockean and the Olsonian, and the mind-machine example. Suppose that everyone agrees on my shallow analysis of what it is to be an deflatable dispute. On this basis, a philosopher argues that the dispute is deflatable because there do not exist facts about whether *A* survives mind-machine cases. This makes explicit a particular point of disagreement: whether mind-machine cases are metaphysically possible. Rather than quarrelling over what makes a dispute deflatable, philosophers can argue over whether mind-machine cases are metaphysically possible.

Secondly, there is a concern that 'deeper' analyses are improperly global. My analysis is shallow because it does not explain what it is for a fact to be *relevant to a dispute*. Deeper analyses of mere verballity seek to clarify which facts are relevant. However – intuitively – whether a fact is relevant is local to the dispute in question. Attempts to make global judgements on which facts are relevant are therefore problematic.

⁵Chalmers (2011) being an example.

For example, Jenkins (2014) considers an analysis that declares linguistic facts as irrelevant. Yet, by ruling that linguistic facts are never relevant, the analysis is susceptible to counterexamples of substantive, verbal disputes, such as whether ‘coffee’ is a noun. Intuitively, two individuals can substantively disagree on whether ‘coffee’ is a noun. However, this disagreement will be *linguistic* disagreement. Hence, if linguistic facts are never relevant to disputes, then it follows that the dispute is deflatable: the wrong result.

To reiterate, then, the problem with ‘deeper’ analyses of mere verballity is that they handle globally what should be local. Whether or not a given fact is relevant is relative to the dispute at issue. Furthermore, it is often a controversial issue whether or not a fact is relevant, or even whether that fact exists. Trying to stipulate globally when a fact is relevant therefore invites incorrect results and controversy into the analysis.

Rather than providing *analyses* of mere verballity, I propose that the deflationist is better served finding *heuristics* for when a dispute is merely verbal. These heuristics should be used to persuade the neutral observer that a dispute meeting their conditions are merely verbal. As heuristics, these conditions needn’t be sufficient nor necessary. Furthermore, they may admit of exceptions, such that some substantive disputes meet the heuristic conditions. The important thing is that the heuristics are *reliable* guides to whether a dispute is merely verbal. If they are, then these heuristics can take their place in deflationist, local arguments against disputes. Though they may not conclusively *prove* that a dispute is merely verbal, this reflects the reality that it is often controversial to call a dispute merely verbal.

The next three chapters consider some heuristics, provided by Hirsch (2005, 2009, 2016), Chalmers (2011) and Thomasson (2009, 2015, 2016) respectively. In the next section, I consider a more general threat to these deflationary methodologies: the threat of hyperintensional manoeuvres.

2.3 Introducing Hyperintensional Manoeuvres

Hyperintensional manoeuvres constitute a direct threat to deflationary heuristics. In brief, they work as follows. The deflationist plausibly argues that there is no disagreement over any relevant extensional or intensional fact in a dispute. They therefore suggest that the dispute should be deflated. The substantivist

– making a *hyperintensional manoeuvre* – argues that there is disagreement over relevant *hyperintensional* facts. This maintains the substantivity of the dispute.

Consider the following example. The dispute pertains to the metaphysics of free will. The compatibilist argues that free will is compatible with the truth of determinism. The incompatibilist argues that free will is incompatible with the truth of determinism. Suppose that a deflationist demonstrates that the compatibilist and the incompatibilist agree on all relevant extensional and intensional facts. For example, it may be argued that the disputants mean something different by ‘free will’. Once we interpret the disputants accordingly, it may be that there is no extensional or intensional disagreement between the compatibilist and the incompatibilist. The deflationist thus suggests that the dispute should be deflated.

To this, the substantivist makes a hyperintensional manoeuvre. She appeals to disagreement over whether the compatibilist’s or incompatibilist’s notion of free will is *really* free will. Given the compatibilist and the incompatibilist mean something different by ‘free will’, the substantivist argues, there is room for substantive disagreement over which property best aligns with the structure of objective reality: which property is the more *fundamental*.

Different variants of hyperintensional manoeuvre work with different notions of fundamentality. In the case we have just considered, the issue comes down to which *property* is more fundamental. A substantivist might analyse this in terms of Lewis’s (1983) naturalness, such that:

Fundamentality as Naturalness: A property α is more fundamental than another property β iff (1) α is more natural than β ; or (2) α is perfectly natural and β is not perfectly natural.

Additionally, other hyperintensional manoeuvres might appeal to disagreement over whether one *fact* is more fundamental than another. A substantivist might analyse this in terms of metaphysical grounding, such that:

Fundamentality as Grounding: A fact p is more fundamental than another fact q iff (1) p grounds q ; or (2) p is not grounded by any fact and q is grounded by some fact.

Consider a dispute about the existence of tables. The setup of the dispute is as follows. There is a world, w_1 , at which there exist simples arranged ‘tablewise’ and no other simples. A van Inwagen-style (1990, 1994) *mereological nihilist*, who believes that only simples exist, asserts that there are no tables at w_1 (as tables are non-simple objects). A Lewis-style (1983) *mereological maximalist*, meanwhile, believes not only that composite objects exist, but also that *any* collection of simples forms an object. Consequently, they assert that there is a table at w_2 : the fusion of those simples arranged tablewise.

Suppose that we apply to this dispute a deflationary heuristic. We may find that the mereological nihilist, with some complications, is willing to interpret the mereological maximalist’s ‘there are tables at w_1 ’ as true in the mereological maximalist’s own language. For example, the mereological nihilist may interpret the offending sentence ‘there are tables at w_1 ’ (in the mereological maximalist’s language) as ‘there are simples arranged tablewise at w_1 ’ (in the mereological nihilist’s language). On this basis, we might move to deflate the dispute.

However, what we might call a ‘fundamental nihilist’ might make appeal to the following hyperintensional manoeuvre. In response to the threat of deflation, she backtracks and accepts that there exist tables at w_1 . On the other hand, she insists that her point is that the existence of simples arranged tablewise is *more fundamental* than the existence of a table at w_1 . We can analyse fundamentality here in terms of grounding. The weaker mereological nihilist asserts that the fact that there are simples arranged tablewise at w_1 grounds the fact that there is a table at w_1 . We can also suppose that the mereological maximalist also wants to preserve the substantivity of the dispute, and denies this grounding claim: she argues that there is no hyperintensional distinction between tables and simples arranged tablewise. This reformulates the dispute as about whether there is such a hyperintensional distinction to be found. This dispute, we can imagine, admits the existing, metaphysical arguments of the mereological nihilist and mereological maximalist. Hence, this hyperintensional manoeuvre has prevented the dispute from being deflated.

This represents a grounding-variant of hyperintensional manoeuvre. More generally, the thought is that disagreements over the *priority* of certain facts can be appealed to with grounding-variants of the manoeuvre.

We see something close to a grounding-variant of hyperintensional manoeuvre-

vre in Schaffer (2010b). Schaffer proposes that ‘the most interesting question is not the question of what exists, but is rather the question of *what is fundamental*’ (2010b, 157, his emphasis). He adds that ‘not everything that exists is fundamental. Some entities are grounded in others’ (2010b, 157). These thoughts can form the basis of a grounding-variant of hyperintensional manoeuvre. Suppose that a deflationary heuristic argues that an ontological dispute should be deflated. The substantivist mounts a hyperintensional manoeuvre, taking the dispute about what exists, and reformulating it into a dispute about what exists *fundamentally*. They add that an individual *a* exists fundamentally iff the fact that *a* exists is ungrounded. Hence, we analyse ‘fundamentality’ in terms of grounding, and we have a grounding-variant of hyperintensional manoeuvre.

Additionally, it may be that many hyperintensional disputes about concepts or properties can be *reformulated* as hyperintensional disputes about the priority of facts. As such, grounding-variants may sometimes be nothing more than *grammatical* variants of other hyperintensional manoeuvres. That there is this grammatical flexibility may be important. Consider this thesis. I argue that both naturalness and grounding-variants of the hyperintensional manoeuvre can be defanged. The substantivist might find my arguments against naturalness-variants to be persuasive, but find reason to reject my arguments against grounding-variants. Being able to reformulate disputes as about grounding claims might therefore preserve disputes that would otherwise be deflated. It is therefore important for my purposes that I challenge both variants of hyperintensional manoeuvre.

In this thesis, I focus on naturalness and grounding-variants. It should be admitted here that there may be alternative variants of hyperintensional manoeuvre, corresponding to different analyses of fundamentality. Wilson (2016), for example, suggests that we might take fundamentality as primitive, whilst Sider (2011) suggests analysing fundamentality in terms of his primitive structure. My thesis is incomplete in this sense. However, the thought is that these alternative treatments of fundamentality are in relative infancy. More work elucidating such notions is needed before I can apply analogous arguments to their respective variants of hyperintensional manoeuvre. Naturalness and grounding, by contrast, have received much contemporary interest. This aids the conceptual grasp of these notions upon which my arguments rely. Consequently, my position is that I will be able to provide analogous arguments only

when these notions are more expansively elucidated upon.

2.4 Conclusion

I am now in a position to conclude the chapter.

This chapter is mostly elucidatory. My goal has been to introduce the reader to modern deflationism, and to the idea of hyperintensional manoeuvres that threaten deflationary heuristics.

The next three chapters concern some specific deflationary methodologies as case studies, taken from Hirsch (2005, 2009, 2016), Chalmers (2011) and Thomasson (2009, 2015, 2016) respectively. In §2.2, I presented arguments for thinking that these methodologies should not be treated as giving *analyses* of mere verballity, but instead should be treated as providing *heuristics* for when a dispute is merely verbal. These heuristics are designed to form the basis of deflationary, local arguments against philosophical disputes.

In §2.3, I introduced the idea of a hyperintensional manoeuvre and sketched out how they threaten deflationary heuristics. In the next three chapters, we see that variants of hyperintensional manoeuvre directly threaten each specific heuristic.

Chapter 3

Case Study: Eli Hirsch and the Equivalence Condition

3.1 Introduction

This chapter takes Hirsch's (2005, 2009, 2016) Equivalence Condition as a case study for understanding deflationary heuristics.

The goal of this chapter is threefold. First, in §3.2, I outline what Hirsch's Equivalence Condition is, to provide an example of a deflationary heuristic. These deflationary heuristics are what I want to defend throughout this thesis, so it is worth ensuring that the reader is familiar with a few specific examples. Second, in §3.3, I distance the Equivalence Condition from the thesis of quantifier variance. Hirsch suggests that different speakers can mean different things by the quantifier. I review some problems with this thesis, and argue that quantifier variance and the Equivalence Condition heuristic stand independently of one another.

Third, in §3.4, I demonstrate that Hirsch's Equivalence Condition heuristic is vulnerable to a variant of hyperintensional manoeuvre. This demonstrates the need for this thesis: that deflationists need an external defence against hyperintensional manoeuvres. In §3.5, I conclude.

3.2 The Equivalence Condition

Hirsch suggests that a merely verbal dispute ‘is a dispute in which, given the correct view of linguistic interpretation, each party will agree that the other party speaks the truth in its own language’ (2009, 239). Hirsch (2005) clarifies that this is intended as a *sufficient condition* for a dispute being merely verbal, not a necessary condition or full analysis.

Before clarifying this methodology, it is worth pausing to consider why Hirsch’s suggestion is not an analysis. Chalmers (2011) and Jenkins (2014) both note that sometimes an interpretation scheme will not be available such that each party can recognise the other as speaking the truth in their own language.

For example, suppose that two disputants disagree over the colour of grass. *A* argues that grass is green. *B*, meanwhile, argues that grass is grue until time *t*, and bleen after *t*.¹ These two positions are equivalent, and the dispute is intuitively merely verbal. Assuming that each party has sufficient linguistic resources, they should agree that the other party speaks the truth in their own language. However, we can suppose that neither party does have sufficient linguistic resources. For example, we can imagine that the green-speaker does not possess any temporal vocabulary. This means that they cannot talk of ‘after *t*’ or ‘before *t*’. This makes it impossible for them to interpret the grue-speaker as speaking the truth in their own language. Hence, Hirsch’s condition cannot be a necessary condition of mere verballity.

As noted in §2.2, however, I am not seeking an *analysis* of mere verballity from Hirsch. Instead, I consider Hirsch as offering a *heuristic* for determining whether a dispute is merely verbal. With this in mind, let us clarify Hirsch’s proposal.

Applying Hirsch’s own refinements, Hirsch (2016) argues that a dispute is merely verbal if the three-part *Equivalence Condition* is met:

1. ‘For any side *x* in the dispute, and any controversial sentence *C*, there is a sentence *S* such that, if *x* were to suppose that *S* as used by *x* is equivalent to *C* as used by the other side, then *x* would no longer disagree with the other side about *C*’ (Hirsch 2016, 110).

¹For this example, *a* is grue iff *a* is green before *t*, and blue after *t*. Meanwhile, *a* is bleen iff *a* is blue before *t*, and green after *t*.

2. ‘For any controversial inference IC (i.e., an inference that is accepted by one side but not the other) there are two noncontroversial inferences IC1 and IC2 such that one side claims that IC is equivalent to IC1 and the other side claims that IC is equivalent to IC2 (where two inferences are equivalent when the premises and conclusion of one are equivalent, respectively, to the premises and conclusion of the other)’ (Hirsch 2016, 106)
3. ‘Whichever side one adopts, one ought to agree that there is a possible language in which the noncontroversial sentences remain as is and the controversy-ending equivalences hold’ (Hirsch 2016, 111).

Before I proceed with a demonstration, it is worth considering what it is for two sentences to be *equivalent*.

We might say that two sentences are equivalent if they have the same truth-values in all possible worlds (that they are ‘cointensional’). In §3.4, I argue that the Equivalence Condition heuristic is vulnerable to hyperintensional manoeuvres. On the current proposal, it is easy to see why. The thought is that – on this understanding of ‘equivalent’ – two sentences can be equivalent and yet differ hyperintensionally. Intuitively, it follows that there can be substantive, hyperintensional disagreement despite the positions in the dispute being equivalent.

A limitation of the current proposal, however, is that it implies that all sentences expressing necessary truths are equivalent. For example, it would follow that ‘ $2 + 2 = 4$ ’ and ‘for all x , $x = x$ ’ are equivalent. This is a counterintuitive position. I think that this is a good reason to be suspicious of equivalence-as-cointensionality. With this in mind, we might propose instead that two sentences are equivalent iff they have the same *meaning*.

It might be responded that the substantivist is now owed a theory of meaning. However, I think that this is an unfair demand. As aforementioned, I treat the Equivalence Condition as a *heuristic* for exposing deflatable disputes. This is compatible with proper disagreement over whether a dispute is deflatable. In some applications of the Equivalence Condition, a substantivist might complain that the purported equivalences being appealed to are not genuine – that there is some difference in meaning between the relevant sentences in their respective languages. When this difference in meaning turns on a hyper-

intensional difference – perhaps some difference with regards to some relative naturalness or grounding claim, this represents a hyperintensional manoeuvre. Otherwise, the substantivist may appeal to some other distinction between the two sentences that bears on their meaning. I am content for the Equivalence Condition heuristic to be mediated through different theories of meaning, such that those with different theories of meaning may disagree on specific applications of the heuristic.

I turn to demonstrating the Equivalence Condition heuristic in practice. Consider the following dispute. Suppose that we have van Inwagen-style (1990, 1994) mereological nihilist and a Lewis-style (1983) mereological maximalist, as described in §2.3. Now consider the following possible world, w_1 . This possible world contains two simples and no other simples. We then ask the question: how many objects exist at this possible world?

The mereological nihilist responds that there are exactly two objects: corresponding to each simple. The mereological maximalist responds that there are exactly three objects: two corresponding to each simple, and one corresponding to the fusion of the two simples. This represents a dispute between the mereological nihilist and the mereological maximalist.

Hirsch (2009) is inclined to take these kinds of mereological disputes as merely verbal. We should therefore expect that we can apply the Equivalence Condition to this case.

Both sides assert some sentence that the other side takes to be controversial. Let us take each in turn. The mereological maximalist finds the mereological nihilist to be asserting something controversial by C_1 : ‘there are exactly two objects at w_1 .’ By clause 1 of the Equivalence Condition, there should be some sentence S_1 such that, if the mereological maximalist were to suppose that S_1 as used by the mereological maximalist is equivalent to C_1 as used by the mereological nihilist, then the mereological maximalist would no longer disagree with the mereological nihilist about C_1 .

Meanwhile, the mereological nihilist finds the mereological maximalist to be asserting something controversial by C_2 : ‘there are exactly three objects at w_1 .’ By clause 1 of the Equivalence Condition, there should be some sentence S_2 such that, if the mereological nihilist were to suppose that S_2 as used by the mereological nihilist is equivalent to C_2 as used by the mereological maximalist, then the mereological nihilist would no longer disagree with the mereological

maximalist about C_2 .

I propose that both C_1 (as asserted by the mereological nihilist) and C_2 (as asserted by the mereological maximalist) are equivalent to the following sentence, S (as asserted by both sides):

S : There are exactly two simples at w_1 .

Hence $S = S_1 = S_2$. S is equivalent to the mereological nihilist's assertion that there are exactly two objects at w_1 (that is, C_1), because they believe that the only objects are simples. Similarly, S is equivalent to the mereological maximalist's assertion that there are exactly three objects at w_1 (that is, C_2), because they believe that any collection of simples forms an object. Straight-forward mathematics delivers that, when there are exactly two simples at w_1 , there are exactly three objects at w_1 (using the mereological maximalist's language).

Both the mereological nihilist and the mereological maximalist should accept S as true. Hence, if the mereological maximalist supposes that S (as asserted by the mereological maximalist) is equivalent to C_1 (as asserted by the mereological nihilist), then they would no longer disagree with the mereological nihilist about C_1 . The case is analogous for the mereological nihilist when considering C_2 . This meets clause 1 of the Equivalence Condition for this dispute.

Meanwhile, we can see that clause 2 of the Equivalence Condition is met for this dispute. The mereological maximalist will make controversial inferences such as 'there are exactly two simple objects at w_1 , therefore, there are exactly three objects at w_1 '. Following the reasoning above, the mereological nihilist can take this controversial inference to be equivalent to the noncontroversial (and trivial) inference that 'there are exactly two simple objects at w_1 , therefore, there are exactly two simple objects at w_1 '.

Similarly, the mereological nihilist will make controversial inferences such that 'there are exactly two simple objects at w_1 , therefore, there are no other objects at w_1 '. Again, we can apply the work above. The mereological maximalist can take this controversial inference to be equivalent to the noncontroversial (and trivial) inference that 'there are exactly two simple objects at w_1 , therefore, there are no other simple objects at w_1 '.

We can see how this translation scheme will make any controversial inference equivalent to noncontroversial inferences, such that clause 2 of the Equivalence Condition is met for this dispute.

This leaves clause 3 of the Equivalence Condition. This is the condition that the mereological nihilist should accept that there is a possible language where their C_1 is equivalent to S , and that the mereological maximalist should accept that there is a possible language where their C_2 is equivalent to S . Speaking loosely, it is the condition that both sides should accept that the other side's language is a possible language.²

I propose that we should reformulate clause 3 as follows:

- 3*. Whichever side one adopts, one ought to agree that there is a possible language in which the non-controversial sentences remain as is and the controversy-ending equivalences hold, *and it would be appropriate to interpret each disputant as speaking this possible language.*

This is to meet the objection that it is trivial to find a language in which the non-controversial sentences remain as is and the controversy-ending equivalences hold: by wilfully misinterpreting the disputant as simply asserting the other side's position verbatim in some gerrymandered language.³ We rule out these wilful misinterpretations by insisting that each disputant must be *appropriately* interpreted as speaking in those relevant languages.

To demonstrate clause 3* in action, we can imagine a possible language, Cat-Dog, in which the predicate 'is a cat' and the predicate 'is a dog' are equivalent. In Cat-Dog, the words 'cat' and 'dog' refer to the same property (perhaps the property of being a cat or a dog). This does not mean that we cannot have substantive disputes over whether a given animal is a dog. For such a dispute to be deflatable by the Equivalence Condition heuristic, it also

²Characterising the disputants as having different languages does encounter difficulties with *semantic deference*, however. Burge (1979) suggests that speakers can semantically defer to their linguistic community. If the mereological nihilist and the mereological maximalist ostensibly belong to the same linguistic community, then it is implausible that they speak different languages. On the other hand, we can adopt Hirsch's characterisation of one side's language as 'the language that would belong to an imagined linguistic community typical members of which exhibit linguistic behaviour that is relevantly similar to X 's' (2009, 239). Appealing to counterfactual languages avoids the issue of semantic deference.

³My thanks to Jon Litland and Michael Potter for raising this issue.

must be charitable to interpret a disputant as speaking in Cat-Dog. This is typically not the case.⁴

Hirsch (2009) stresses the importance of the principle of charity, such that the correct interpretation of a speaker does not assign obviously false beliefs to that speaker. He (2016) describes this as the ‘first degree’ of Carnapian tolerance. Returning to the mereological example, suppose that the mereological nihilist did *not* take the mereological maximalist’s C_2 as equivalent to S . Suppose that, instead, the mereological nihilist interpreted the mereological maximalist’s C_2 as equivalent to what the mereological nihilist would mean by C_2 . This would imply that the mereological maximalist somehow thought that there were three simple objects at w_1 , and had dramatically failed to conceptually grasp the set-up of the debate. This would not be charitable. It is not charitable to think that the mereological maximalist has somehow failed to grasp the sentence ‘this possible world contains two simples and no other simples.’ It is more charitable to think that there is a possible language where the mereological maximalist’s C_2 is equivalent to the mereological nihilist’s S . Analogous remarks can be made for the possibility of the mereological nihilist’s language.

On this basis, we can support the claim that (an appropriately strengthened) clause 3 of the Equivalence Condition is met for this dispute. All the clauses are met, so it follows that the dispute is merely verbal.

The substantivist might challenge the appropriateness of the interpretations Hirsch gives for the mereological nihilist and maximalist. I will presently consider two such challenges. I argue that Hirsch has the resources to handle the first objection. Furthermore, I contend that the second objection ultimately collapses into the first.

The first objection is that the two disputants might insist that Hirsch has interpreted them incorrectly, given that they intended to disagree. From this, we might think that there is something inappropriate about Hirsch’s interpretations. Surely the disputants know what they mean!

However, Hirsch has the resources to meet this line of attack. Clause 3 of the Equivalence Condition states that ‘whichever side one adopts, one *ought* to

⁴Where it is charitable to interpret a speaker this way, it is intuitive that the dispute is deflatable. Suppose that Sherbie is a cat. Person A says that Sherbie is a dog, and is charitably interpreted as speaking in Cat-Dog. Person B argues that Sherbie is not a cat. Intuitively, their disagreement is not substantive, but instead turns on merely verbal disagreement.

agree that there is a possible language in which the noncontroversial sentences remain as is and the controversy-ending equivalences hold' (Hirsch 2016, 111, my emphasis). That the disputants *ought* to agree on a certain interpretation is consistent with them neglecting to actually do so. This is because the disputants may not apply appropriate interpretative principles as they should.

Indeed, Hirsch presumably *must* disagree interpretatively with the disputants. This is because most philosophical disputes are not *supposed* to be merely verbal. Hence, disputants will typically interpret their own positions as supporting substantive debate. It would be too strong to give speakers absolute authority on how they should be interpreted: otherwise unintentional, merely verbal disputes would be impossible. Consequently, there is something suspect about allowing self-regarding interpretations to trump Hirsch's interpretations without further debate. Hirsch offers interpretative principles to support his interpretations. To challenge those interpretations, the substantivist should offer arguments to undermine those principles, or offer plausible principles of their own that support their own interpretations. I contend that Hirsch should not be impressed by self-regarding, substantivist interpretations until these further arguments have been made.

The second objection is more sophisticated.⁵ However, I argue that it ultimately collapses into the first objection.

The objection is as follows. There will be disputes that are *associated* with the dispute over how many objects exist at w_1 : disputes that use the same terms and are argued by the same disputants. We might therefore expect the same interpretations to hold – and it might speak to the inappropriateness of those interpretations if they could not be applied consistently across these disputes. However, the interpretations that might seem plausible with regard to one dispute may seem less plausible with regard to another, associated dispute.

Take, for example, a dispute over the existence of parts. The mereological nihilist asserts (in their language) C_3 : 'no object has a proper part'. The mereological maximalist asserts (in their language) C_4 : 'some object has a proper part'.

Given that the dispute is mereological, and many of the same terms are employed, we might think that the same interpretations should apply across the two disputes. As such, by 'object', the mereological nihilist should be in-

⁵My thanks to Jon Litland for raising this challenge.

terpreted as uttering ‘simple object’ in the mereological maximalist’s language. Hence, C_3 is equivalent to S_3 (said in the mereological maximalist’s language):

S_3 : No simple object has a proper part.

However, we might think that the mereological nihilist’s complicated arguments to advance this trivial, analytic truth makes trouble for our interpretation.

On the other hand, as in the case of the first objection, Hirsch might say that the mereological nihilist has misinterpreted their own position. This misinterpretation has led them to make complex arguments in favour of a trivial point. This collapses the second objection into the first. From there, the response Hirsch should make is to present his interpretative principles and show that they are plausible. This meets the accusation of unkindness, and the substantivist must show why Hirsch’s principles are flawed or incorrectly applied.

As noted, Hirsch offers the satisfaction of the Equivalence Condition as a *sufficient* condition for mere verballity. This may be true. Nonetheless, for sake of argument I treat Hirsch’s methodology as constituting a weaker condition: namely a *heuristic* for determining when a dispute is merely verbal. A heuristic for determining mere verballity is simply a *reliable* method for determining when a dispute is merely verbal. This is consistent with the heuristic admitting of the occasional exception: that is, where the Equivalence Condition is satisfied but the dispute is not merely verbal.

I offer this concession not because I can think of such an exception, but because this is all I think the deflationist really needs. As noted in §2.2, it is normally a controversial, opinionated matter whether a philosophical dispute is merely verbal. It is implausible to think that everyone will accept that if the Equivalence Condition is satisfied by a dispute, then that dispute should be abandoned as deflatable. On the other hand, the satisfaction of the Equivalence Condition forms the basis of an effective argument to *persuade* a neutral party that the dispute is merely verbal. We should not ask more of the Equivalence Condition.

3.3 The Equivalence Condition and Quantifier Variance

Hirsch connects his methodology with the idea of quantifier variance. It is therefore important to understand what this amounts to. In this section, I argue that it is difficult to pin down what quantifier variance is. On the other hand, using the deflationary heuristic represented by the Equivalence Condition does not commit the deflationist to quantifier variance.

In the example dispute above, the mereological nihilist and the mereological maximalist disagree on how many objects there are in world w_1 . The mereological nihilist believes that there are exactly two objects, and the mereological maximalist believes that there are exactly three objects. Further, we have seen that the dispute satisfies the Equivalence Condition and so can be seen as merely verbal. This raises the question of what the mere verballity of the dispute consists in. Hirsch's (2009) suggestion is that the mereological nihilist and the mereological maximalist mean something different by 'there are'. They therefore talk past one another, in virtue of using different existential quantifiers. That the meaning of the quantifier can differ in this way is the thesis of quantifier variance.

The difficulty is spelling out precisely what it means for the meaning of the quantifier to differ between the disputants. Thomasson (2016), who rejects quantifier variance, argues that the meaning of the quantifier is given by its introduction and elimination rules in natural deduction. Given that the mereological nihilist and the mereological maximalist presumably agree on these natural deduction rules for their quantifiers, it would follow from Thomasson's suggestion that they mean the same thing by 'there are'.

To salvage quantifier variance, we need an alternative way of understanding the meaning of the quantifier. A naïve thought is to characterise quantifier variance in terms of domain restriction. The thought is as follows. The meaning of the quantifier cannot be separated from its interpretation (that is, its *logical* interpretation) – namely, the domain of objects that the quantifier is taken to range over. We might think that the mereological maximalist uses a quantifier that ranges over a larger domain – given as the powerset of the set of simples. We then say that the mereological nihilist's quantifier is restricted, such that its domain only contains the simples.

Philosophers find difficulty with this suggestion. Sider (2009) and van In-

3.3. THE EQUIVALENCE CONDITION AND QUANTIFIER VARIANCE 49

wagen (2009) argue that characterising quantifier variance in terms of domain restriction assigns to the mereological nihilist a contradictory position. Suppose that the mereological nihilist remarks that “existence’ in the language of the mereological maximalist results from letting the quantifiers range over a larger domain, one that contains fusions’. The issue is that this remark is given *in the mereological nihilist’s own language*. It follows that the mereological nihilist has just acknowledged that there is a domain that contains fusions. This implies that there are fusions, contradicting the mereological nihilist’s position.

Hale & Wright (2009) take this as a reason to reject the notion of quantifier variance – that it cannot be understood in terms of domain restriction, and that there are no obvious alternatives for characterising the thesis. As it is, I propose that we can use Hirsch’s Equivalence Condition without committing ourselves to quantifier variance.

In the example dispute we have been considering, I identified some *sentences* that form the basis of the dispute. These are the mereological nihilist’s ‘there are exactly two objects at w_1 ’ and the mereological maximalist’s ‘there are exactly three objects at w_1 ’. The Equivalence Condition heuristic works by showing that there is a possible language whereby those controversial sentences are equivalent to non-controversial sentences. In this dispute, I proposed that both sentences when uttered by their respective sides are equivalent to ‘there are exactly two simples at w_1 ’ in some possible language. This demonstrates that the controversy is merely verbal – that the controversial sentences are actually equivalent to some non-controversial sentences. The important thing is that we have not had to appeal to quantifier variance at any stage in this argument. We have pinned down the offending *sentences*, and it is not obvious that we have to further pin down the *subsential components* that make the dispute merely verbal.

The point is that there is no necessary link between quantifier variance and the Equivalence Condition heuristic. The Equivalence Condition heuristic finds equivalence between *sentences*, whilst quantifier variance is about subsential components. Meanwhile, there are some difficulties with explaining precisely what quantifier variance amounts to. I therefore propose that the heuristic be considered independently from the thesis of quantifier variance – adopting the former does not commit us to the latter.

3.4 The Equivalence Condition and Hyperintensional Manoeuvres

The Equivalence Condition, in clause 3, suggests that there exist various possible languages. Further, it suggests that some disputes are merely verbal because disputants use different languages. In the example considered in §3.2, the thought is that there is a mereological nihilist language and a mereological maximalist language. When one disputant correctly interprets the other into their own language, the apparently controversial sentences are seen to be equivalent to non-controversial sentences. Hence, ‘each party will agree that the other party speaks the truth in its own language’ (Hirsch 2009, 239).

In this instance, an available hyperintensional manoeuvre is to ask which language *best* represents reality.

Suppose that the only difference between the mereological nihilist’s language and the mereological maximalist’s language is what is meant by the quantifier. This accepts the thesis of quantifier variance. The substantivist’s hyperintensional manoeuvre in this case is to ask which concept of existence is more fundamental: which carves more closely at the joints of objective reality. This might be understood in terms of Sider’s (2011) structure: which quantifier is the more *structural*.

However, following the discussion in §3.3, we may be suspicious of the thesis of quantifier variance. Alternatively, then, we can interpret languages holistically. In this case, the substantivist’s hyperintensional manoeuvre is to ask which language is more natural.⁶

The focus here seems to be on concepts and languages. If the relevant distinctions are *properties*, we might analyse fundamentality in terms of naturalness. However, in the mereological case described, concepts other than properties may well be relevant: most saliently – if the substantivist accepts the thesis of quantifier variance – the quantifier. In this case, the substantivist might analyse fundamentality in terms of structure.

⁶It may be difficult to compare the relative naturalness of *languages*. This is because a language can be more natural than its rival in some respects, and less natural in others. For example, suppose L_1 and L_2 are languages. Suppose that L_1 has predicates referring to perfectly natural *biological* properties and L_2 does not. In this respect, L_1 is more natural than L_2 . However, we can also suppose that L_1 has predicates referring to imperfectly natural *chemical* properties and L_2 has predicates referring to perfectly natural chemical properties. In this respect, L_1 is less natural than L_2 . Combining the two scenarios, it is not obvious which language is more natural *overall*. I leave this difficulty for the substantivist to answer.

Either way, by arguing that one language might be more fundamental than another, the substantivist raises problems for the Equivalence Condition heuristic. Even if the Equivalence Condition is met, a dispute may still be substantive in virtue of disagreement over which language is more fundamental. This disagreement will turn on the existing, metaphysical arguments of the mereological nihilist and mereological maximalist. Hence, such a hyperintensional manoeuvre prevents the dispute from being reformulated or deflated at all.

3.5 Conclusion

This concludes my discussion of Hirsch's Equivalence Condition heuristic. In §3.2, I introduced what the deflationary heuristic amounts to. In §3.3, I argued that the heuristic should be considered independently of the thesis of quantifier variance. However, in §3.4, I demonstrated that the Equivalence Condition heuristic is vulnerable to argument by hyperintensional manoeuvre.

This begins to build the case for the importance of this thesis. If deflationists are to make use of the Equivalence Condition heuristic, they need a defence from hyperintensional manoeuvres. In the next chapter, I build on this point by considering another case study: that of Chalmers's Method of Elimination heuristic.

Chapter 4

Case Study: David Chalmers and the Method of Elimination

4.1 Introduction

In this chapter, I consider Chalmers's (2011) method of elimination as a deflationary heuristic.

The structure of this chapter mirrors that of the previous chapter. In §4.2, I detail the method of elimination and show how it should be considered a deflationary heuristic. In §4.3, I distance the method of elimination from other elements of Chalmers's philosophy. Chalmers has complicated and interesting ideas of hyperintensionality that are partly at odds with my defence of deflationary heuristics from hyperintensional manoeuvres. I discuss these ideas – in particular his notion of a 'bedrock dispute' – in that section.

Next, in §4.4, I show that Chalmers's method of elimination heuristic is vulnerable to variants of hyperintensional manoeuvre. This further demonstrates the need for my thesis to defend deflationists. In §4.5, I conclude the chapter.

4.2 David Chalmers and the Method of Elimination

Chalmers (2011) provides the method of elimination as a heuristic for detecting merely verbal disputes. The basic principle is to eliminate use of a key term, and to see whether a substantive dispute can be articulated without that key term. If we cannot, then the dispute is wholly verbal. Note that Chalmers is

writing about verbal rather than *merely* verbal disputes – Jenkins (2014) notes that substantive, verbal disputes meet Chalmers’s criteria.

Suppose that there is a dispute over a sentence S that is potentially verbal with respect to a key term t . The method of elimination proceeds as follows:

1. Bar the use of t .
2. Try to find a sentence S' in the restricted vocabulary such that the parties disagree non-verbally over S' , and the disagreement over S' is part of the dispute over S .
3. If there is such an S' , the dispute over S is not wholly verbal. If there is not such an S' , the dispute over S is wholly verbal.

To fully articulate this methodology, we need to spell out what it is for a disagreement over S' to be *part of* the dispute over S . Chalmers offers two glosses on the idea. The first is in terms of metaphysical grounding, such that ‘a dispute over S' is part of a dispute over S when the parties disagree over S partly *in virtue* of disagreeing over S' ’ (2011, 527, his emphasis). The second is in terms of counterfactuals, such that a dispute over S' is part of a dispute over S when ‘(i) if the parties were to agree that S' is true, they would (if reasonable) agree that S is true, and (ii) if they were to agree that S' is false, they would (if reasonable) agree that S is false’ (2011, 528).

The method of elimination cannot be an *analysis* of what it is for a dispute to be verbal, as Chalmers notes. This is because the method of elimination appeals to the notion of non-verbal disagreement (in clause 2), and thus would be circular as an analysis. Instead, I treat the method of elimination as a useful *heuristic* for determining when a dispute is merely verbal.

We can better apprehend the method of elimination with an example. Suppose persons A and B dispute the sentence S , given as ‘Pluto is a planet’. A thinks S is true and B thinks S is false. Further suppose that A and B agree on the mass of Pluto, its size, its orbital behaviour, and so on. We might suspect that the dispute is merely verbal with respect to the key term ‘planet’, playing the role of t . We therefore apply the method of elimination.

We begin by barring the use of the expression ‘planet’. We then see if we can find a sentence S' in the restricted vocabulary such that the parties disagree non-verbally over S' , and the disagreement over S' is part of the dispute over

S . Intuitively, there are no such S' , because A and B agree on all other facts about Pluto. Consequently, we can conclude that the dispute over S is wholly verbal, as is intuitive.

A special application of the method of elimination is what Chalmers calls the *subscript gambit*. Suppose that we have a philosophical, ‘what is X ?’ question, such as ‘what is justice?’ or ‘what is personal identity?’ Chalmers suggests that the corresponding disputes are often wholly verbal. Suppose A says ‘ X is such-and-such’ whilst B says ‘ X is so-and-so’. The subscript gambit involves banning the term X and introducing two new terms, X_A and X_B , such that X_A is equivalent to ‘such-and-such’ and X_B is equivalent to ‘so-and-so’. We then proceed with the method of elimination and try to find a substantive dispute between A and B regarding X_A and X_B , that is part of the original dispute over X .

The subscript gambit closely resembles Hirsch’s Equivalence Condition heuristic. It works on the same principle: providing interpretations that allow both sides to recognise that the other is speaking the truth with their own terms. Given Hirsch’s Equivalence Condition is more developed, it is perhaps a preferable heuristic when the subscript gambit would be employed.

More generally, Chalmers’s method of elimination is sub-sentential, whereas Hirsch’s Equivalence Condition is sentential. Chalmers asks the deflationist to eliminate a particular term from the dispute, whilst Hirsch seeks equivalences at the level of sentences. In this sense, Hirsch’s heuristic is broader and perhaps more encompassing.

As a heuristic, the method of elimination admits of exceptions. Chalmers discusses the possibility of *vocabulary exhaustion*. If the language of the dispute has a limited vocabulary, then barring the use of a key term t may prevent the formulation of any disagreement that is even *part* of the original disagreement over S . This might be the case even if the dispute is not wholly verbal.

However, it seems to me that there is some tension between the subscript gambit and the possibility of vocabulary exhaustion. This is because the subscript gambit allows the deflationist to *introduce* new terms that should prevent vocabulary exhaustion.

Nonetheless, we can make sense of the method of elimination and see how it applies in practice. I now turn to Chalmers’s notion of a bedrock dispute, arguing that it represents a further conflict in the methodology Chalmers ar-

ticulates.

4.3 Bedrock Disputes

Chalmers (2011) applies his methodology to argue that the dispute between compatibilists and incompatibilists over free will is wholly verbal. Chalmers applies the subscript gambit, introducing terms ‘free will_A’ and ‘free will_B’, and argues that the disputants have no substantive disagreement regarding free will_A and free will_B that is part of the original dispute. He concludes that the original dispute is wholly verbal.

The details of this application of the method of elimination is not what concerns me here. Instead, it is his response to the following objection. Chalmers considers the response that the original dispute is about what free will *really* is: whether free will_A or free will_B is *really* free will. This objection is an appeal to hyperintensionality. Asking whether free will_A is really free will is equivalent to asking whether free will_A is the more fundamental notion, the concept of free will that carves most closely at the joints of reality.

Chalmers responds that it is hard to see what ‘really’ amounts to, if the issue is meant to be philosophical. He notes that asking whether free will_A is really free will could be understood as asking whether free will_A is the *ordinary, English concept* of free will. However, if the appeal to ‘really’ is meant to be anything deeper than this, then Chalmers suggests it is opaque what is being appealed to.

I propose that this response is unpersuasive. Increasingly, work is being done on hyperintensional notions, seeking to clarify what is meant by appeals to fundamentality. We might cash it out in terms of grounding, or else in terms of naturalness, and there is contemporary work on understanding the theoretical roles these concepts play. A wholesale rejection of the meaningfulness of such notions threatens to become increasingly implausible to the neutral spectator as this work continues.

Moreover, Chalmers’s response sits uneasily with what he writes about *bedrock disputes*. A bedrock dispute is a substantive dispute that appears wholly verbal by the method of elimination, but, due to vocabulary exhaustion, represents an exception to the heuristic. The thought is that the dispute involves ‘a concept so basic that there is no hope of clarifying the dispute in

more basic terms' (2011, 543).

Chalmers's example of a bedrock dispute is that of the dispute over 'only particles exist'. He applies the subscript gambit, such that we take 'exists₁' to range only over simple objects and 'exists₂' to be such that 'there exists₂ an *F*' is equivalent to 'there exist₁ simples arranged *F*-wise'.¹ Suppose that both parties agree that only particles exist₁ and that it is not the case that only particles exist₂. Despite this agreement, Chalmers suggests that there is residual disagreement over whether particles *exist* – whether existence₁ or existence₂ coincides with *existence*. Chalmers adds that once basic quantifiers are barred, this dispute might be impossible to state, but that this is a case of vocabulary exhaustion. Hence, the original dispute is a bedrock dispute.

Analogous reasoning, however, could defend the substantivity of the dispute between compatibilists and incompatibilists. Both *A* and *B* agree that free will_{*A*} is compatible with the truth of determinism, and that free will_{*B*} is incompatible with the truth of determinism. However, we might appeal to residual disagreement over whether free will_{*A*} coincides with *free will*. This dispute cannot be stated once we have barred use of the term 'free will', but this is just a case of vocabulary exhaustion. Hence, the dispute is a substantive, bedrock dispute.

Chalmers does not clarify what the substantive dispute between the existence₁ theorist and the existence₂ theorist amounts to.² We can therefore interpret him in a number of ways. My favoured interpretation is that Chalmers is making an appeal to hyperintensionality when discussing the dispute over 'only particles exist'. The 'bedrock manoeuvre' – the manoeuvre that delegitimises application of the method of elimination – can be interpreted as an appeal to hyperintensionality. It is whether existence₁ or existence₂ is *really* existence, or, equivalently, whether existence₁ or existence₂ is more *fundamental*, carving more closely at the joints of logical nature.³ However, by this interpretation, Chalmers's scepticism regarding the appeal to hyperintensionality in the case of free will should apply equally to the manoeuvre in the case of existence.

This might give us reason to find another interpretation of Chalmers. He does not explicitly use the phrase '*real* existence' or 'hyperintensional'. An al-

¹This application of the subscript gambit seems to appeal to quantifier variance. In §3.2, I argue that the thesis of quantifier variance is problematic. However, I ignore these issues for the purposes of the present discussion.

²My thanks to Jon Litland and Michael Potter for raising this point.

³As per the discussions found in Sider (2011).

ternative interpretation, then, is that the dispute concerns incompatible identity claims – whether existence is to be identified with existence₁ or existence₂.

However, this interpretation faces its own difficulty regarding the significance of the notion of existence being appealed to in this dispute. If ‘existence’ refers to a metaphysically privileged notion of existence – a *joint-carving* notion – then it is not obvious how to capture this metaphysical privilege without hyperintensional notions. We would say that ‘existence’ refers to *real* existence, or the *fundamental* notion of existence. Hence, the dispute becomes whether existence₁ or existence₂ is hyperintensionally privileged. This transforms bedrock manoeuvres into hyperintensional manoeuvres, collapsing our current interpretation into my first.

We therefore need the status of the notion of existence in the dispute to be different. The problem is that it is not clear what this could be – if not metaphysically privileged – if we are to preserve the substantivity of the dispute between the two disputants. For example, if ‘existence’ simply refers to the *ordinary, English-speaker’s notion* of existence, then the significance of the dispute becomes interest-relative. This is because establishing (say) that existence₁ is the English ‘existence’ is only important insofar as we are interested in ordinary English for our metaphysics. Some philosophers – such as Sider (2011) – explicitly focus on other languages, such as ‘Ontologese’.

Chalmers offers the bedrock manoeuvre to preserve the substantivity of the dispute over existence. Our second interpretation reflects this goal with a significant caveat: the resultant dispute is not deflatable, but this comes at the cost of its metaphysical significance. To avoid this caveat, I therefore favour my first interpretation of Chalmers. This interprets him as making a hyperintensional manoeuvre.

Chalmers acknowledges that he represents a *moderate* Carnapian, and that a less moderate deflationist would reject the idea of bedrock disputes. On my favoured interpretation of Chalmers, then, it seems that the appeal to hyperintensionality is sometimes legitimate and sometimes not. However, Chalmers does not provide a methodology for determining when the appeal to hyperintensionality is legitimate. This represents a significant lacuna in our interpretation of his deflationary heuristic.

Perhaps more can be said about when the appeal to hyperintensionality is legitimate. Some appeals to hyperintensionality seem more implausible than

others. For example, we might think that a necessary condition for an appeal to hyperintensionality to be legitimate is that the key term t relates to an objective, mind-independent phenomenon. This reflects the idea that no subjective, mind-dependent concepts are *fundamental*, or part of the deeper structure of reality. Recall again the dispute over ‘Hilary Clinton’s policies are right wing’. An appeal to hyperintensionality is illegitimate here, because the key term ‘right wing’ does not relate to an objective, mind-independent phenomenon: being right of a political centre is too much of a human, subjective matter. If we could sketch out such heuristics in more detail, addressing when the appeal to hyperintensionality is known to be legitimate, then this would help fill our lacuna.

An alternative approach, and one I favour, is to abandon moderate deflationism and resist the phenomenon of bedrock disputes. As noted, this treats what we might call the ‘bedrock manoeuvre’ as a form of hyperintensional manoeuvre. Parts 2 and 3 provide strategies for defanging hyperintensional manoeuvres and protecting deflationary heuristics from them. Avoiding this problem for the method of elimination provides an additional motivation for such efforts.

4.4 The Method of Elimination and Hyperintensional Manoeuvres

As detailed in §4.3, Chalmers considers something that can be interpreted as a hyperintensional manoeuvre. Consider again the dispute between compatibilists and incompatibilists. Chalmers applies the method of elimination, banning the term ‘free will’ and arguing that the heuristic demonstrates the dispute to be wholly verbal.

In response, the substantivist argues that the dispute is actually about which concept of free will is *really* free will. This question cannot even be asked if we bar the use of ‘free will’, such that we have a case of what Chalmers calls ‘vocabulary exhaustion’: a limitation of the method of elimination. The dispute over which concept is really free will – or is the *fundamental* concept of free will – is conducted with the existing, metaphysical arguments of the compatibilist and incompatibilist. Hence, this hyperintensional manoeuvre prevents the dispute from being reformulated or deflated at all.

Given the focus on the property of free will, substantivists making this hyperintensional manoeuvre may analyse fundamentality in terms of naturalness. The question is which concept-candidate for free will is most natural – which carves most closely at the joints of nature.

As noted in §4.3, Chalmers argues that the appeal to hyperintensionality in this instance is obscure. However, as discussed, Chalmers may need to provide more detail of why appealing to hyperintensionality is obscure in some instances, but correct in others. Alternatively, we can abandon Chalmers’s ‘moderate deflationism’, and offer the assistance of my thesis to protect the method of elimination from hyperintensional manoeuvres.

4.5 Conclusion

Here, I conclude my case study on Chalmers’s method of elimination. In §4.2, I detailed the method of elimination as a deflationary heuristic. In §4.3, I discussed Chalmers’s views on hyperintensionality. I argued that the method of elimination heuristic can be considered independently from Chalmers’s moderate deflationism, and suggested abandoning the latter. In §4.4, I argued that abandoning moderate deflationism renders the method of elimination vulnerable to hyperintensional manoeuvres. This further motivates the work of this thesis in defending deflationary heuristics from hyperintensional manoeuvres.

The next chapter considers our last case study: that of Thomasson’s easy ontology.

Chapter 5

Case Study: Amie Thomasson's Easy Ontology

5.1 Introduction

This chapter represents my third and final case study of a deflationary heuristic that is challenged by hyperintensional manoeuvres. In this chapter, I consider Thomasson's (2009, 2016) easy ontology heuristic.

This chapter is shorter than the two preceding it. In §5.2, I present Thomasson's easy ontology. Then, in §5.3, I argue that the easy ontology methodology is vulnerable to hyperintensional manoeuvre. In §5.4, I conclude.

The reason that this chapter is shorter is because I do not present further discussion about the philosophical ideas that Thomasson employs. This is not because they are uninteresting or do not merit comment. However, such discussions are rather specific to Thomasson's easy ontology.¹ Consequently, they are not of direct relevance to the idea of deflationary heuristics, or to the notion of hyperintensional manoeuvres that threaten them.

¹I would qualify this point: some of the criticisms levelled against Thomasson's easy ontology are inherited from criticisms of Carnap. For example, Eklund (2016) argues that Thomasson relies on the analytic/synthetic distinction, which is vulnerable to Quine's (1951) influential arguments. I believe that Quine's arguments are undermined by the counterarguments of his contemporaries, in particular Grice & Strawson (1956). Thomasson (2007) also appeals to these arguments to defend her methodology.

Similarly, Hofweber's (2016) complaint that a framework analysis is uncharitable to the nominalist applies to Thomasson, but is directed at Carnap. Other criticisms of Thomasson's easy ontology are more directed, such as Evnine's (2016) 'too much content' objection. I believe that Thomasson (and Carnap) can be defended from these objections: see Button (2016) and Creath (2016) for presentation of such defences.

5.2 Amie Thomasson's Easy Ontology

Thomasson (2009, 2016) provides an 'easy' approach to ontology, inspired by Carnap's (1950) thoughts on ontological questions. Hofweber (2016) describes Carnap's 'big idea' as the thought that there are two kinds of ontological question. As noted in §2.1, some ontological questions are internal to the framework, whilst others are external. Precisely what this means depends on what is meant by 'framework'. Thomasson (2016) and Price (2009) suggest that Carnapian frameworks are best understood in terms of the use/mention distinction.

On this interpretation, ontological questions made internally *use* the relevant concepts rather than mention them. Thomasson's (2009, 2016) thought is that linguistic competency of such concepts come with an understanding of a concept's *application* and *co-application* conditions. The application conditions govern when the concept can be first applied (in some sense, its conditions for existence or instantiation) and the co-application conditions govern when the concept can be re-applied (its individuation conditions). In this section, my focus is on application conditions. By appealing to application conditions, ontological questions are straightforward to answer. When we ask 'do *K*s exist?', we check the application conditions for '*K*' and then undergo the relevant analytic or empirical work to check whether those conditions are met. If they are met, then *K*s exist. If they are not met, then *K*s do not exist.

For example, suppose that the concept of chairs has the application condition such that there is a chair iff there are atoms arranged 'chair-wise'. Suppose someone asks whether chairs exist. Thomasson suggests that we look at the application conditions of 'chair' and undertake the relevant tests to check if the application conditions have been met. In this case, we undertake empirical checks to confirm that there are atoms arranged chair-wise. By the application conditions, it follows, straightforwardly, that chairs exist.

Thomasson (2016) notes that what is easy about this ontology is its *methodology*. Philosophical work is required to discover the application conditions behind a concept. Once we have a good grasp of the application conditions, analytical or empirical work is then required to test if the application conditions have been met. That this methodology is straightforward does not preclude these two stages being cognitively or practically difficult. For example, discovering the application conditions behind 'free will' might involve some

difficult conceptual work. Meanwhile, the empirical work required to check if the application conditions of 'black hole' have been met may involve difficult empirical work. Nonetheless, on Thomasson's methodology, the philosopher's role is limited. The philosophical work is in making explicit our linguistic competencies when it comes to certain concepts, rather than making direct, ontological arguments.

To head off a potential misconception, the result is not anti-realism: that existence is only relative to a framework. Once the follower of Thomasson's methodology is in a position to say that chairs exist, they are also in a position to say that chairs exist language-independently: the obtaining of application conditions can be an objective matter. Instead, 'the point is the simple, almost trivial observation that for a question to be asked meaningfully the terms in it must be governed by rules of use' (Thomasson 2016, 126).

Further, it should be noted that Thomasson's easy ontology is not committed to disputants speaking different languages or using different frameworks, as we have seen in Hirsch's Equivalence Condition heuristic or Chalmers's method of elimination. External disputes (if not nonsense) are disagreements over which concepts should be adopted into the framework by those occupying the *same* framework.²

Consider the example dispute from §3.2. We have a world, w_1 , described as containing exactly two simple objects. The mereological nihilist says that there are exactly two objects at w_1 , corresponding to the two simples. The mereological maximalist says that there are exactly three objects at w_1 , two corresponding to the two simples, and one corresponding to their fusion. In a nutshell, the two disputants dispute the truth-value of the claim 'fusions exist'. We can apply Thomasson's methodology to this dispute.

Suppose that theoretical work found that the application condition of 'fusion' is as follows:

If there are some things, then there exists a fusion of those things.

Having provided these application conditions, it is not charitable to interpret 'fusions exist' as internal to the framework. This is because 'fusions exist' is trivially true if it is internal. After all, both the mereological nihilist and the mereological maximalist agree that there are some things at w_1 . It follows from

²My thanks to Jon Litland and Michael Potter for this clarification.

the application condition of 'fusion' that fusions exist. By contrast, the mereological nihilist denies 'fusions exist', treating the matter as both non-trivial and difficult. It would be uncharitable to interpret the mereological nihilist as making such a basic, conceptual mistake.

However, if 'fusions exist' is not an internal sentence, then 'fusion' is not governed by rules of use. It seems to follow that 'fusions exist' is incomprehensible, and that the mereological nihilist and the mereological maximalist are arguing over nonsense. This does not seem particularly charitable either.

The solution is to treat 'fusions exist' as external to the framework. External questions (or sentences) *mention* rather than use the relevant concepts. External questions are questions about whether the relevant concept should be adopted into the framework. However, this question is *pragmatic*, turning on issues of fruitfulness, simplicity and our interests. Nonetheless, it is a way of interpreting the two metaphysicians such that their dispute is neither trivial nor meaningless. In the present example, we interpret them as disputing whether the concept of fusions should be adopted.

Thomasson's easy approach to ontology therefore has a deflationary impact on this dispute. Either 'fusions exist' is internal or it is not. If it is internal, then it is trivially true, and the dispute should be settled. If it is not internal, then it is either nonsense or external. If it is nonsense, then the dispute should be abandoned. If it is external, then the dispute is reformulated into a dispute about the pragmatics of accepting the concept of fusions. This deflates what was a serious, metaphysical dispute into a pragmatic issue. Consequently, I am minded to treat Thomasson's easy approach to ontology as constituting a deflationary heuristic.

5.3 Easy Ontology and Hyperintensional Manoeuvres

When we make a hyperintensional manoeuvre to Thomasson's methodology, the idea is that some frameworks are objectively privileged. The substantivist goes along with Thomasson in reformulating the original dispute as an external question. This means that the relevant concepts are *mentioned*, rather than used. However, the substantivist denies that it is a pragmatic matter as to whether the relevant concept should be adopted. Instead, they insist that some frameworks are objectively privileged: that they are more *fundamental*

than other frameworks, such that their concepts ‘cut more closely at the joints of objective reality’. The thought is that we should adopt the fundamental framework – the question is then the substantive, metaphysical one of whether the relevant concept is contained in the fundamental framework.

Consider the mereological dispute over how many objects exist at w_1 . We have seen how this dispute is deflated by Thomasson’s easy ontology.

When responding with a hyperintensional manoeuvre, the substantivist accepts that whether fusions exist at w_1 – when construed internally – is trivially answered. They therefore agree that the dispute should be seen as over an *external* question about whether the concept of fusions should be introduced to the framework. However, they deny that this dispute is pragmatic. This is because there is a privileged, fundamental framework that either contains the property of being a fusion, or does not. This is the question of whether the property of being a fusion is *fundamental*. The substantivist argues that determining which properties are in the privileged framework is a substantive, non-pragmatic issue. The arguments that bear on the matter are those existing, metaphysical arguments given by the mereological nihilist and the mereological maximalist. Hence, the dispute has not been meaningfully reformulated or deflated. This is a naturalness-variant of hyperintensional manoeuvre, as fundamentality is applied to properties.

Consequently, Thomasson’s methodology needs defence against hyperintensional manoeuvres.

5.4 Conclusion

This concludes the final case study of deflationary heuristic. In §5.2, I outlined Thomasson’s easy ontology methodology. In §5.3, I demonstrated its vulnerability to hyperintensional manoeuvres.

As previously noted, the aim of these case studies is to motivate my thesis. These deflationary heuristics are what I want to defend. Meanwhile, I want to defend them *from* hyperintensional manoeuvres. It is therefore helpful to demonstrate what some of these deflationary heuristics amount to, and indeed show that they are vulnerable to hyperintensional manoeuvres. The next Part gets to the task of providing an external defence against hyperintensional manoeuvres.

My thesis defangs hyperintensional manoeuvres by providing ‘deflationary-friendly’ interpretations of those primitives. The thought is as follows. Suppose that I can show that the correct interpretation of naturalness is such that it is a subjective, interest-relative matter whether one property is more natural than another, or whether one property is perfectly natural. If we analyse ‘fundamentality’ in terms of naturalness, then whether a property is more fundamental than another becomes a subjective, interest-relative matter. This renders fundamentality *deflationary-friendly*.

To see why deflationary-friendly interpretations help the deflationist against hyperintensional manoeuvres, consider the following. The substantivist argues that an otherwise deflated dispute is substantive, because there is disagreement on some matter of fundamentality. However, if matters of fundamentality are subjective and interest-relative, this reformulation of the dispute fails to preserve its substantivity. Even the reformulated dispute fails to be about anything objective or deeply metaphysical. This meets the substantivist’s argument directly.

It is perhaps worth noting that the subjectivity of fundamentality does not prevent disagreement about fundamentality. However, it does mean that such disagreement will be *subjective* disagreement. This is typically insufficient to preserve the substantivity of metaphysical debate: which are normally meant to concern objective matters.

The main argument of this thesis is that naturalness and grounding should be given deflationary-friendly interpretations. Applying the argument above, this defangs naturalness and grounding-variants of hyperintensional manoeuvre. My thesis therefore defends deflationary heuristics from two variants of hyperintensional manoeuvre.

Part II

Chapter 6

Deflationary-Friendly Naturalness

6.1 Introduction

In Part 2, I focus on the hyperintensional primitive of naturalness. I present a deflationary-friendly interpretation of naturalness. This provides an internal response to the naturalness-variant of hyperintensional manoeuvre against deflationary heuristics.

I defend the following biconditional:

Deflationary-Friendly Naturalness: Property α is *perfectly natural* iff α is a property referred to by a primitive predicate in the language of ideal science.

Throughout Part 2, I use ‘perfectly scientific’ as follows:

Perfectly Scientific: α is a perfectly scientific property iff α is referred to by the primitive predicates of the language of ideal science.

It follows that Deflationary-Friendly Naturalness is equivalent to the claim that α is a perfectly natural property iff α is a perfectly scientific property.

The thought is that the choice of language for ideal science is partly subjective and interest-relative. If this is so, then this interest-relativity pushes through Deflationary-Friendly Naturalness, such that it is interest-relative whether

α is perfectly natural. This allows the deflationist to mount a response blocking hyperintensional manoeuvres.

In this chapter, I introduce the concept of naturalness and explain this deflationary-friendly interpretation. In §6.2, I introduce naturalness and relative naturalness. In ch.11, I return to the subject of relative naturalness – here, I only provide a gloss of the notion. In §6.3, I reintroduce Deflationary-Friendly Naturalness and explicate what is meant by ‘ideal science’. In §6.4, I argue that the language of ideal science is such that my interpretation is indeed deflationary-*friendly*. I also sketch out my strategy for showing that Deflationary-Friendly Naturalness is the *correct* interpretation of naturalness. In §6.5, I conclude.

Throughout, I sometimes use italics to indicate that I am talking about a property. For example, I may write ‘*being green*’ rather than ‘the property of being green’. This convention is adopted for sake of readability.

6.2 Introducing Naturalness

(Perfect) naturalness is standardly understood as a metaphysical primitive, not admitting of analysis. Lewis (1983, 346) introduces the natural properties as an ‘elite minority of special properties’. The thought is that some properties are objectively privileged by the structure of the world. For example, Lewis suggests that the microphysical properties used by physicists, such as *being a quark*, might well be perfectly natural.

A paradigmatic example of naturalness is seen in the difference between the property of being green, and the property of being grue. An individual a is grue iff a is green before time t , and a is blue after t , for some specified, future t .¹ It is intuitive that there is something *deficient* about *being grue* when compared to *being green*. This can be understood in terms of naturalness. The property of being green is said to be relatively natural, whilst the property of being grue is unnatural. The property of being green carves relatively well at the joints of objective reality, whilst the property of being grue does not.

This is a case of *relative* naturalness – the property of being green is not *perfectly* natural. Taylor (1993) notes that Lewis takes perfect naturalness to

¹There are alternative analyses of ‘grue’. Goodman’s (1955) original notion is such that an individual a is grue iff a is green and unexamined, or a is blue and examined. However, when discussing naturalness, nothing depends on which analysis of grue I work with.

be primitive, and analyses relative naturalness in terms of perfect naturalness. Examples of perfectly natural properties are found in physics, which ‘is relevant because it aspires to give an inventory of natural properties’ (Lewis 1983, 356–7). Science is constantly evolving, so it only gives us an educated approximation of which properties are perfectly natural. Hence, it is reasonable to think that the property of being a quark is perfectly natural, whilst the property of being a chair is not.

Lewis (1983) defines relative naturalness in terms of definitional complexity. As Guigon (2014, 391) puts it, the degree to which a property is natural is ‘a mere function of the relative complexity of the way less-than-perfectly natural properties are defined out of their perfectly natural basis’.

For sake of example, suppose that the properties of being green, of being red, and of being yellow are perfectly natural. Suppose that an individual that is green or red is *gred*, and an individual that is green, red or yellow is *gellow*. On these suppositions, the perfectly natural definition of the property of being gred is given by ‘ x is gred iff (x green or x is red)’. Meanwhile, the perfectly natural definition of the property of being gellow is given by ‘ x is gellow iff (x is green or x is red or x is yellow)’. The perfectly natural definition analyses the property in terms of perfectly natural properties. Furthermore, the perfectly natural definition of gellow is more complex than the perfectly natural definition of gred – it mentions a greater number of perfectly natural properties, and utilises a greater number of logical connectives. On this basis, we conclude that gred is more natural than gellow.

There are some difficulties with the definition of relative naturalness. In ch.11, I discuss these problems at length. However, these are not special problems for Deflationary-Friendly Naturalness. These problems must be answered by any naturalness theorist, regardless of whether naturalness is interpreted to be deflationary-friendly.

I turn to the grammar of naturalness. Naturalness is a second-order property on properties. It is unclear whether second-order properties can be natural or unnatural, but I presume not for Part 2: otherwise, we run into puzzles of whether perfect naturalness is itself perfectly natural. Note that I treat relations as n -ary properties, such that relations can also be perfectly natural. I assume that relative naturalness forms a partial, well-ordering on properties.

Secondly, (perfect) naturalness is a metaphysical primitive. This means

that a conceptual grasp of the notion is aided by considering the theoretical roles to which the concept is applied. These are as follows:

Similarity: Two individuals a and b are similar iff they both instantiate some property, α , such that α is a relatively natural property.

Duplicates: Two individuals a and b are duplicates iff they instantiate exactly the same perfectly natural properties.

Intrinsic Properties: A property α is intrinsic iff, for any two duplicates x and y , $\alpha x \leftrightarrow \alpha y$.

Supervenience: Properties of type A supervene on properties of type B iff A -duplicates are B -duplicates.

Events: An event is the set of properties of regions that are predominantly intrinsic.

Causation: As per Lewis's famous counterfactual account, when the antecedent of a counterfactual $C \Box \rightarrow E$ is a set of duplicate, initial world-segments.

Materialism: Materialism is the claim that 'among worlds where no natural properties alien to our world are instantiated, no two differ without differing physically; any two such worlds that are exactly alike physically are duplicates' (Lewis 1983, 364).

Mental Content: The content of an intentional state is constrained by what is natural.

Law of Nature: A law of nature is a true generality in our best theory of the world, when competing theories are presented in perfectly natural terms.

In ch.7, I consider the theoretical roles which vindicate Deflationary-Friendly Naturalness: such that deflationary-friendly naturalness is compatible with those roles. In ch.9 and ch.10, I consider the problem cases: Mental Content and Law of Nature, respectively. In each chapter, I argue that these theoretical roles fail for any interpretation of naturalness. It is therefore of no consequence that Deflationary-Friendly Naturalness is incompatible with these applications.

6.3 Deflationary-Friendly Naturalness

It is worth repeating how deflationary-friendly interpretations of naturalness undermine naturalness-variants of hyperintensional manoeuvre.

The basic idea is that a deflationary-friendly interpretation of naturalness makes it a subjective, interest-relative matter as to whether one property is more natural than another. Hence, if fundamentality is analysed in terms of naturalness, it is a subjective, interest-relative matter as to whether one property is more fundamental than another.

Hyperintensional manoeuvres work by reformulating the dispute about what is *fundamentally* the case. However, if fundamentality is subjective and interest-relative, what is fundamentally the case is only of pragmatic significance. Hence, such a manoeuvre would intuitively fail to preserve the substantivity of the dispute. Instead, it becomes its own form of *deflation*.

This demonstrates my motivation in seeking a deflationary-friendly interpretation of naturalness. I offer the following biconditional:

Deflationary-Friendly Naturalness: Property α is *perfectly natural* iff α is a property referred to by a primitive predicate in the language of ideal science.

Conceptions of Ideal Science

It is important not to understand ‘ideal science’ even partly in terms of naturalness, otherwise Deflationary-Friendly Naturalness becomes viciously circular. For example, it had better not be the case that an ideal science is one that only works with perfectly natural properties. Otherwise, the deflationary-friendliness of Deflationary-Friendly Naturalness would be in doubt, or fall into incoherence.

Instead, by ‘ideal science’, I mean a specific, modal notion. It is worth discussing the notion in some depth, and adopting a discursive approach to highlight important points along the way.

By way of a first attempt, we might say that ideal science is a complete science adopted by consensus of scientists at the closest world w to our own where:

1. Some complete science is discovered at w .

2. Science progresses at w in a way such that what is referred to as ‘science’ at w is recognisably the same discipline as what is referred to as ‘science’ at our world.

Let us say that a world w meeting these conditions is a ‘ideal science-world’. It should be noted that if we actually discover a complete science in the future, the actual world would be an ideal science-world.

However, there are some significant problems with our first conception of ideal science.² We have no guarantee that the closest ideal science-world is anything like the actual world. Hence, the closest ideal science-world may not share our world’s perfectly natural properties. In such a scenario, Deflationary-Friendly Naturalness fails to adequately capture our perfectly natural properties, and thus fails as an interpretation of naturalness.

On these grounds, we might be tempted to abandon a modal conception of ideal science. For example, we might say ideal science is the *most* complete science that *will* be discovered in the actual world. However, this is an over-correction and has problematic results. We do not suppose that we presently know all of the perfectly natural properties. For example, we might suppose that some fundamental, quantum properties are yet to be discovered by science, and that these properties may be perfectly natural. However, if the actual world suffers a mass extinction event tomorrow, then the language of the most complete science discovered at the actual world does not have predicates for these undiscovered, quantum properties. It follows on our present conception of ideal science and Deflationary-Friendly Naturalness that these properties are not perfectly natural. This seems to be the wrong result.

This suggests that we are correct to adopt a modal conception of ideal science. The key is to impose restrictions on the kind of ideal science-worlds we are interested in. Importantly, the ideal science-worlds we consider must be worlds w that are sufficiently like the actual world. I propose that this can be captured by two restrictions:

3. w and the actual world share the same best theories.
4. Scientists in w and actual scientists (broadly) share the evaluative criteria for determining the best theories.

²My thanks to Jon Litland and Michael Potter for raising this objection.

I discuss the notion of best theories at length in ch.10. Lewis (1983) analyses a best theory as one that optimally balances the theoretical virtues of simplicity and strength. A simple theory is tractable and easier to understand. A strong theory has comparatively many deductive consequences.

It is important to clarify that an ideal science – defined as a *complete* science – is unlikely to be a *best* theory. This is because an ideal science does not seek to balance simplicity against strength. By contrast, because an ideal science must be complete, it is likely to afford a sub-optimal weight to strength over simplicity. Hence, the notion of an ideal science is importantly distinct from the notion of a best theory.

Nonetheless, worlds that share best theories are suitably similar for our purposes. It is plausible that worlds that share best theories share perfectly natural properties.

This brief discussion explains our first restriction. I offer a second restriction because of the following worry. Lewis (1983) notes that any theory – if presented in a suitably gerrymandered language – can be maximally simple and strong.³ Lewis’s solution is to insist that we evaluate the simplicity and strength of theories when they are presented in a perfectly natural language.

We cannot help ourselves to the same manoeuvre, because we are seeking to offer an analysis of naturalness. It would be viciously circular to analyse naturalness (even partly) in terms of naturalness. Our ‘substantive punt’ is to consider modal situations where people use pretty similar methods for evaluating theories when compared to actual scientists. This avoids the problem, because actual scientists evaluate theories in non-gerrymandered languages. A theory that is maximally simple and strong when presented in a gerrymandered language is likely to be highly complex and/or weak when it is presented in a natural language. Given that choosing to evaluate theories in a highly gerrymandered language is a significant departure from the evaluative criteria of actual scientists, the second restriction solves the problem of gerrymandering.

I call this the ‘substantive punt’ because the substantivist should also endorse the idea that our current methods of best theory evaluation are *broadly* correct – such that we should only be interested in worlds with similar evalu-

³This point shall be explored in more detail in ch.10. Lewis’s application of naturalness does not cohere well with Deflationary-Friendly Naturalness. This is because our deflationary understanding seeks to define naturalness (partly) in terms of the notion of best theories. Meanwhile, Lewis’s application of naturalness involves defining the notion of best theories (partly) in terms of naturalness. This point is also discussed in more detail in ch.10.

ative methods. Otherwise, we could not assume that our current theories are even reliable *approximations* of a best theory. This would lead to a profound scepticism of science that does not reflect the appeals of naturalness theorists to fundamental physics. For example, Lewis treats fundamental physics as our main epistemology for naturalness, noting that ‘physics is relevant because it aspires to give us an inventory of natural properties’ (Lewis 1983, 356-7). This does not tally with serious doubts about the progress of science – and it is hard to see how we can be confident in the progress of science if we are not broadly confident in how scientists evaluate their theories.

To recap, then, an ideal science is a complete science adopted by consensus of scientists at the closest world w where:

1. Some complete science is discovered at w .
2. Science progresses at w in a way such that what is referred to as ‘science’ at w is recognisably the same discipline as what is referred to as ‘science’ at our world.
3. w shares with our world the best theories.
4. w (broadly) shares with our world the evaluative criteria for determining the best theories.

Ideal science is ideal in this precise, modal sense. It is ideal because ideal science may not be discovered at the actual world. This exhausts the sense in which ideal science is ideal. In particular, ideal science does not assume anything about scientists at w being idealised, epistemic agents.

I have noted that ideal science is complete. A complete science is such that every non-modal fact is a theorem of that theory.⁴

Other Considerations

For the moment, I make the assumption that there is a unique, ideal science. It is conceivable that there are numerous complete sciences: different theories of the world with different primitives and different vocabulary. If this is the

⁴If desired, we can alternatively stipulate that the theory is complete iff every non-nomological fact is derivable from the theory *and* a sentence detailing the initial conditions of the universe.

case, then ideal science is a (hopefully unique) complete science that would be adopted by consensus of scientists.

In ch.8, I return to the assumption that there is a unique, ideal science. There are complications, stemming from whether scientists would adopt a unique theory by consensus, and whether they adopt the same unique theory at each relevant, closest world. If they do not, then there is not a unique, ideal science. This complicates my evaluation of Deflationary-Friendly Naturalness. I propose that Deflationary-Friendly Naturalness can be defended as performing at least as well as its rivals in such scenarios, but I reserve that discussion for ch.8.

Given that these theories are idealised and I am discussing counterfactuals, it is epistemologically indeterminate whether a given predicate is primitive in the language of ideal science. We don't know for sure what ideal science looks like. Even if we knew some complete sciences, we might not know which particular science would be selected on the consensus of scientists at *w*.

I embrace this *epistemological* indeterminacy because it seems inherent in the epistemology of naturalness for the substantivist as well. As noted above, Lewis (1983) points to physics as central to our epistemology of naturalness. Other than looking to the predicates of fundamental physics, he offers no epistemology for determining which properties are to be considered perfectly natural. Presumably, any naturalness theorist would accept that science is liable to change with new scientific advances. Consequently, our current science only offers an *approximation* of which properties are perfectly natural. Insofar as we don't know how science will turn out, there is epistemological indeterminacy as to which properties are perfectly natural.

Lewis has materialist tendencies. However, this is not necessarily reflected in Deflationary-Friendly Naturalness. Suppose that the property of being a belief turned out to be an indispensable primitive in all complete theories of the cosmos. By how 'ideal science' is defined, it follows that *being a belief* would correspond to a primitive predicate in the language of ideal science. By Deflationary-Friendly Naturalness, it would follow that *being a belief* is perfectly natural.

If materialism turns out to be true, then *being a belief* is not perfectly natural. However, materialism may be false. More generally, if contemporary science turns out to be dramatically wrong, then our current approximation of

the perfectly natural properties is entirely wrong. This would be a disaster, but it is not clear how the naturalness theorist could avoid it. Insofar as they accept that contemporary science is a guide to which properties are perfectly natural, they are vulnerable to a dramatic failure of science (on any interpretation of naturalness).

Hence, ideal science does not necessarily resemble contemporary science, though it is reasonable to take contemporary science as our best approximation.⁵ A property referred to by a primitive predicate of the language of ideal science may not be what we currently think of as a *physical* property. That there is variation over time in what we take to be physical, or even *scientific*, is no new phenomenon. Kuhn (1996, 104) notes that Molière ‘ridiculed the doctor who explained opium’s efficacy as a soporific by attributing to it a dormitive potency’, but that, by the 1740s, ‘electricians could speak of the attractive ‘virtue’ of the electric fluid without thereby inviting the ridicule that had greeted Molière’s doctor a century before’ (1996, 106).

Deflationary-Friendly Naturalness reflects the idea that the perfectly natural properties are sparse. This is because the perfectly natural properties are referred to by *primitive* predicates in the language of ideal science. If a predicate is primitive, then it cannot be defined by other predicates in the language. Hence, the predicate (and its corresponding property) is indispensable in the complete theory of the world (ideal science). It follows that the property is sparse.

I propose that my interpretation is plausible because of the close link between fundamental physics and the perfectly natural properties posited by naturalness theorists. I have already quoted Lewis’s (1983) claim that physics aspires to give an inventory of natural properties. Other philosophers have also noticed this connection. Williams (2011, 3) remarks that ‘fundamental physics, [Lewis] thought, would be our best guide to the perfectly natural properties’. Meanwhile, Loewer (2007, 315) notes that ‘Lewis says that it is the job of physics to find fundamental laws and because fundamental laws link perfectly natural properties physics is our best guide to the latter’. Eddon and Meacham (2015) also suggest that we can interpret naturalness in terms of the predicates in an idealised, scientific language. This attention to fundamental science is also seen in Sider’s related notion of structure: Sider (2011, 6) notes

⁵Putting aside issues of pessimistic induction, as discussed by Laudan (1981).

that the perfectly fundamental concepts are ‘certain concepts of physics, logic, and mathematics’.

On the other hand, I speak of an ideal *science* rather than an ideal physics. In doing so, I mean only to make explicit that Deflationary-Friendly Naturalness is compatible with the falsity of materialism. If materialism is true, then perhaps ideal science is an ideal physics, and the distinction fades away to nothing.

I want to defend Deflationary-Friendly Naturalness not only as offering a *viable* interpretation of naturalness, but as offering the *correct* interpretation of naturalness. This defence rests on two ideas: that naturalness is posited explicitly to fulfil a number of theoretical roles, and that being wedded to claims about the fundamental structure of objective reality confers a theoretical cost. The thought is that a cost-benefit analysis favours my deflationary-friendly interpretation of naturalness if it allows the concept to play the same theoretical roles, but more cheaply.

I propose that this is what Deflationary-Friendly Naturalness offers. My deflationary-friendly interpretation of naturalness does not wed naturalness theorists to claims about the fundamental structure of objective reality. This is because it renders naturalness subjective and interest-relative. I argue for this point in the next section.

6.4 The Subjectivity of Deflationary-Friendly Naturalness

In ch.7, ch.9 and ch.10, I argue that Deflationary-Friendly Naturalness keeps faith with all the successful theoretical roles for naturalness proposed by Lewis (1983). Hence, a plausible cost-benefit analysis favours my deflationary-friendly interpretation of naturalness as the correct interpretation. This section examines this claim and defends it, on the basis that deflationary-friendly naturalness incurs fewer costs than deflationary-unfriendly naturalness.

Deflationary-Friendly Naturalness equates the perfectly natural properties with the perfectly scientific properties. I argue that it is a subjective, interest-relative matter whether a property is perfectly scientific. Consequently, by Deflationary-Friendly Naturalness, it is a subjective, interest-relative matter whether a property is perfectly natural. I argue that it is less costly for natu-

ralness theorists if it is subjective whether a property is perfectly natural. This is because this avoids the costs associated with claims about the structure of objective reality.

The Subjectivity of which Properties are Perfectly Scientific

The basic idea is that the choice of language for ideal science is likely to be an interest-relative affair, guided as much by subjective as objective constraints. Evidence for this contention can be found in the philosophy of science: the familiar point being that scientists are guided by influences other than empirical evidence in theory choice. Chakravartty (2017) discusses the idea that the empirical evidence underdetermines our choice of theory, such that once we have to hand all non-nomological data, we may still be left with various, conflicting theories of the world. These arguments from underdetermination have been extensively explored in arguments against scientific realism, tracing back to the ‘Duhem-Quine thesis’ of Duhem ([1906] 1954) and Quine (1951).

If empirical evidence does not select a unique theory, then perhaps some of theory choice can be guided by considering the theoretical virtues of the competing theories: such as simplicity or strength. However, worries soon emerge. Given we are talking about the choice of a complete, *ideal* science, scientists have all the non-nomological data to hand. Hence, objective justifications of appeals to simplicity or strength on the basis of tracking truth or avoiding overfitting do not seem applicable in *ideal* theory choice: see ch.10 for extensive discussion of this point. It is therefore unclear how appeals to theoretical virtues could be justified as *objective* constraints on ideal theory choice. Alternatively, if appeals to simplicity and strength are justified on subjective grounds, then it follows that our choice of ideal theory will be a (partly) subjective affair.

Adding to the worries, it is not obvious that scientists *are* guided only by empirical evidence and theoretical virtues in theory choice. *Social Constructivism* is the thesis that scientific theory choice is partly guided by ‘complex social interactions that inevitably surround and infuse the generation of scientific knowledge’ (Chakravartty 2017). Insofar as these social interactions are interwoven with interest-relative concerns, subjective considerations influence theory choice. Philosophers such as Kuhn (1970) and Feyerabend (1975) advocate *historicism*: engaging in the history of science to expose the role played

by accident and social interaction in theory choice, and in influencing which concepts are thought of as scientific or unscientific. Though some of their conclusions are controversial, it is plausible that science faculties – made up of fallible, human beings – are subject to these kinds of influences.

For example, Collins & Pinch (1993, 74) note that ‘the struggle between proponents and critics in a scientific controversy is always a struggle for credibility’. They discuss a variety of scientific controversies which were influenced by social considerations. For example, they argue that Pons and Fleischmann’s claims to have achieved cold fusion faced an uphill struggle from physicists, partly because ‘they had credibility as electrochemists but not as nuclear physicists’ (1993, 74).

The point is not that we should accept Pons and Fleischmann’s findings. Physicists find good reason to take their claims as impossible, and it is not for me to disagree. Moreover, we might think that it is perfectly rational to afford greater weight to the educated opinions of well-respected physicists. However, the history of the controversy suggests the role that social considerations have in the practice of science. Collins & Pinch note that ‘a vast amount of money, expertise, and equipment had already been invested in hot fusion programs and it would be naïve to think that this did not affect in some way the reception accorded Pons and Fleischmann’ (1993, 74).

It is plausible that contemporary theory choice is partly guided by subjective considerations. From this, it is reasonable to expect that scientists are susceptible to the same kind of influences. Remember that ideal science is ideal only in the sense that it is *complete*: this does not mean that the scientists who propose ideal science are idealised, epistemic agents. If empirical evidence underdetermines ideal science, then these social influences render the choice of ideal science subjective. It is plausible that this is reflected in the primitive predicates of the language of ideal science. Our choice of ideal science is wrapped up in our choice of *language* for our ideal science. The language of ideal science will not have a primitive predicate for *being phlogiston*, because our ideal science does not take phlogiston to represent anything. It follows that there is good reason to think that it is subjective and interest-relative whether a property is perfectly scientific.

There is also a role for historical accident for determining the language of ideal science. Hacking (2007) details how the reference of ‘jade’ was determined

both by commercial interests and historical accident, such that ‘jade’ refers to both jadeite and nephrite. Analogous distinctions have been found in our chemical kinds, such as distinctions between different types of oxygen. It is not clear to me whether the language of ideal science will have a primitive predicate for oxygen, rather than a primitive predicate for each isotope. Presumably, this will be decided by what scientists find to be the most convenient language for expressing their theories. However, what scientists find to be convenient will plausibly be influenced by linguistic accident. Speakers find convenient what they are familiar with. Hacking suggests that what is familiar to us may be a result of historical accident. Hence, what scientists find convenient may be a result of historical accident influencing scientific language.

There are therefore good reasons to think that it is an interest-relative, subjective and accidental matter as to whether a property is perfectly scientific. By Deflationary-Friendly Naturalness, it follows that the same can be said regarding whether a property is perfectly *natural*.

Avoiding the Costs of Deflationary-Unfriendly Interpretations

I have assumed that there is a *cost* involved in making assumptions about the structure of objective reality. In this section, I expand on this point, and argue that Deflationary-Friendly Naturalness avoids this cost.

Naturalness is posited to fulfil a variety of theoretical roles. I propose that it would be best if it fulfilled those theoretical roles without wedding naturalness theorists to deep, metaphysical theses about the fundamental structure of objective reality. A deflationary-unfriendly interpretation of naturalness takes naturalness to impose an *objective*, partial ordering on properties, such that some properties are *objectively* privileged as more fundamental. Deflationary-unfriendly interpretations of naturalness therefore require the assumption that there is an objective structure on properties – that some properties carve at the joints of objective reality in some literal sense. Such talk may be happily accepted by some metaphysicians, but if another interpretation of naturalness can fulfil the same theoretical roles without such assumptions, I propose that this is preferable. These are controversial assumptions that have been met with hostility by some. For example, Taylor (1993, 2006) complains that the notion of carving at the joints is too mysterious.

Deflationary-Friendly Naturalness does not commit the naturalness theo-

rist to joint-carving. Though the interpretation is *compatible* with those joints existing, the existence of objective structure does not follow from deflationary-friendly interpretations of naturalness. This is because Deflationary-Friendly Naturalness renders the perfectly natural properties unsuited for telling us anything about the objective structure of reality. The objective structure of reality should not depend on subjective, interest-relative or accidental matters – if it did, then it would fail to be objective. Deflationary-Friendly Naturalness makes it subjective, interest-relative or accidental whether a property is perfectly natural. Therefore, the perfectly natural properties cannot determine the objective structure of reality.

I say that Deflationary-Friendly Naturalness is compatible with the existence of objective structure to the world. This is because the phenomenon of a subjectively privileged set of properties does not rule out the world having an objective structure. The point is that the posit of this objective structure is dispensable for certain theoretical roles being fulfilled. Assuming my deflationary-friendly interpretation, the phenomenon of natural properties does not justify the thesis that the world has objective structure. On the other hand, the phenomenon of natural properties in no way *contradicts* such a thesis. Deflationary-Friendly Naturalness merely *decouples* the two ideas. As such, Deflationary-Friendly Naturalness is compatible with acceptance, rejection or agnosticism towards objective structure.

Though Deflationary-Friendly Naturalness – when considered independently – is consistent with objective structure, it may play a role in wider arguments against objective structure. Suppose that I was in a position to argue the following claim:

If we can give sense to the concept of objective structure, some deflationary-unfriendly interpretation of naturalness, grounding, or Sider’s (2011) structure is correct.

This claim might be defended on the basis of current philosophical practice. Many philosophers have sought to make sense of objective structure in terms of naturalness, grounding, or Sider’s structure.⁶ Deflationary-friendly interpretations of such notions are insufficient to characterise *objective* structure, because such interpretations render their concepts subjective.

⁶See Schaffer (2009a) and Sider (2011) for two such examples.

Suppose, then, that this claim is true. My thesis makes the argument that

It is not the case that some deflationary-unfriendly interpretation of naturalness or grounding is correct.

In Part 2, I argue that Deflationary-Friendly Naturalness is the correct interpretation of naturalness. I make similar claims about grounding in Part 3.

Suppose that I also provided argument that

It is not the case that some deflationary-unfriendly interpretation of Sider's structure is correct.

Combining the three claims, we can straightforwardly derive that

It is not the case that we can give sense to the concept of objective structure.

As such, we see that Deflationary-Friendly Naturalness can play a role in wider arguments against objective structure.

However, I do not insist on this argument in this thesis. I am not sure about the first claim. For example, Wilson (2016) suggests that we should treat fundamentality as a primitive concept. From there, primitive fundamentality could be used to make sense of objective structure in the world.

The first claim could be amended to accommodate the possibility of primitive fundamentality. However, the second claim would need analogous amendment: that it is not the case that some deflationary-unfriendly interpretation of naturalness, grounding, *Sider's structure*, or *primitive fundamentality* is correct. My thesis does not demonstrate that deflationary-unfriendly interpretations of primitive fundamentality are incorrect, so further argument would be needed on this point to defend this amended argument.

I therefore leave this discussion as merely indicative of a potential, future project against objective structure.

Suppose that my deflationary-friendly interpretation allows naturalness to fulfil a variety of theoretical roles without making assumptions about objective reality, or the existence of structural joints. It follows that it enjoys the same

benefits as a deflationary-unfriendly interpretation, but more cheaply. A plausible cost-benefit analysis would therefore favour my deflationary-friendly interpretation as the preferred interpretation of naturalness. In the next chapter, I begin evaluating the claim that Deflationary-Friendly Naturalness *is* compatible with naturalness's theoretical applications.

6.5 Conclusion

This chapter has introduced naturalness and my deflationary-friendly interpretation: Deflationary-Friendly Naturalness. I have argued that Deflationary-Friendly Naturalness incurs fewer costs than deflationary-unfriendly interpretations of naturalness. This is because my interpretation does not wed naturalness theorists to claims about objective reality.

However, this does not mean that a plausible cost-benefit analysis favours Deflationary-Friendly Naturalness. I must also show that Deflationary-Friendly Naturalness enjoys all the same *benefits* as its rivals. The rest of Part 2 argues for this claim, working through the list of theoretical applications introduced in §6.2. The next chapter focuses on relatively easy cases – where Deflationary-Friendly Naturalness seems compatible with the theoretical roles. Later chapters consider more difficult cases.

Chapter 7

Easy Roles for Deflationary-Friendly Naturalness

7.1 Introduction

Lewis (1983) offers an impressive variety of theoretical roles for naturalness. These theoretical roles help clarify what naturalness is, whilst also helping to justify naturalness as a metaphysical posit. In this short chapter, I focus on the theoretical roles that are unproblematically preserved under my deflationary-friendly interpretation. These form a majority of the theoretical roles, offering good support for Deflationary-Friendly Naturalness.

The thought is as follows. If my deflationary-friendly interpretation can play the same theoretical roles – enjoying the same benefits – but at a lower cost, then a plausible cost-benefit analysis favours Deflationary-Friendly Naturalness. In ch.6, I demonstrated that Deflationary-Friendly Naturalness avoids the costs associated with its rivals. This chapter demonstrates that Deflationary-Friendly Naturalness can enjoy many of the same benefits as its rivals.

In §7.2, I outline the theoretical roles that are to be considered in this chapter. I then argue that Deflationary-Friendly Naturalness permits these theoretical applications. In §7.3, I discuss analyses of similarity in terms of naturalness. In §7.4, I argue that Deflationary-Friendly Naturalness permits the analysis of duplicates in terms of naturalness. From this, a variety of

theoretical roles follow ‘for free’. This is because other theoretical applications for naturalness do not refer to naturalness directly, but instead to *duplication*. In §7.5, I consider analysing materialism in terms of naturalness and argue that Deflationary-Friendly Naturalness is compatible with this application. Finally, §7.6 concludes.

7.2 Theoretical Roles for Naturalness

In this chapter, I consider the following applications for naturalness:

Similarity: Two individuals a and b are similar iff they both instantiate some property, α , such that α is a relatively natural property.

Duplicates: Two individuals a and b are duplicates iff they instantiate exactly the same perfectly natural properties.

Intrinsic Properties: A property α is intrinsic iff, for any two duplicates x and y , $\alpha x \leftrightarrow \alpha y$.

Supervenience: Properties of type A supervene on properties of type B iff A -duplicates are B -duplicates.

Events: An event is the set of properties of regions that are predominantly intrinsic.

Causation: As per Lewis’s famous counterfactual account, when the antecedent of a counterfactual $C \Box \rightarrow E$ is a set of duplicate, initial world-segments.

Materialism: Materialism is the claim that ‘among worlds where no natural properties alien to our world are instantiated, no two differ without differing physically; any two such worlds that are exactly alike physically are duplicates’ (Lewis 1983, 364).

The following sections argue that Deflationary-Friendly Naturalness preserves these theoretical roles for naturalness.

7.3 Similarity

In ch.11, we see how some definitions of relative naturalness make trouble for Similarity. In response to one of these problems, Guigon's (2014) 'similarity supplement' seeks to analyse relative naturalness (partly) in terms of similarity. This means that it is viciously circular to then analyse similarity in terms of relative naturalness. This puts Similarity at risk as a theoretical role for naturalness. However, this is not a special problem for my deflationary-friendly interpretation. Deflationary-unfriendly interpretations run into the same trouble.

Assume, then, that the naturalness theorist has an analysis of relative naturalness that is compatible with Similarity. Under these conditions, I propose that Deflationary-Friendly Naturalness is also compatible with this theoretical role. Given that Lewis takes physics to be our best approximation of the perfectly natural properties, it is plausible that the set of perfectly natural properties is identical with the set of perfectly scientific properties. Hence, my deflationary-friendly interpretation and a deflationary-unfriendly interpretation makes the same judgements regarding the relative naturalness of a given property. They thus deliver the same judgements on whether two individuals are similar.

For example, suppose that *a* exemplifies the properties *being red* and *being 1kg or round*. Suppose further that *b* exemplifies the property *being red*, and *c* exemplifies the property *being 1kg or round*. On this information alone, Lewis would want to say that *a* and *b* are similar, but that it is not clear if *a* and *c* are similar.¹ This is because *being red* is relatively natural, whilst *being 1kg or round* is not relatively natural. However, these judgements of relative naturalness supervene on the set of perfectly natural properties. Consequently, if the set of perfectly natural properties is identical to the set of perfectly scientific properties, it follows that *being red* is relatively natural by Deflationary-Friendly Naturalness, and that *being 1kg or round* is not relatively natural by Deflationary-Friendly Naturalness. Hence, my deflationary-friendly interpretation of naturalness agrees that *a* and *b* are similar, but that it is not clear that *a* and *c* are similar.

¹*a* and *c* might be similar, depending on how they exemplify the property *being 1kg or round*. If both *a* and *c* exemplify the property in virtue of being 1kg, then they are similar in virtue of exemplifying the relatively natural property *being 1kg*.

Consequently, Deflationary-Friendly Naturalness keeps faith with Similarity iff deflationary-unfriendly interpretations of naturalness keep faith with Similarity. Both might fail to preserve Similarity, depending on how relative naturalness is defined. For the purpose of my cost-benefit analysis, this is all that is required: that my deflationary-friendly interpretation enjoys just the same benefits as deflationary-unfriendly interpretations.

7.4 Duplication and its Corollaries

It is important to note that Intrinsic Properties, Supervenience, and Causation make no direct reference to natural properties. Instead, they appeal directly to the notion of a duplicate, which, in Duplicates, is analysed in terms of perfectly natural properties. Meanwhile, Events appeals directly to the notion of intrinsicity. Consequently, if Deflationary-Friendly Naturalness preserves Duplicates, then these additional theoretical roles come ‘for free’.

Happily, Deflationary-Friendly Naturalness preserves the theoretical role represented by Duplicates. On my deflationary-friendly reading, Duplicates is synonymous with the claim that two individuals a and b are duplicates iff they instantiate exactly the same perfectly scientific properties. As Lewis (1983) takes the perfectly scientific properties to just be those properties that are perfectly natural, Duplicates produces the same set of duplicates on any interpretation of naturalness.

For example, suppose that a exemplifies two properties: that of being a quark and that of being north of point x .² Similarly, b exemplifies two properties: that of being a quark and that of being south of x . Lewis would want to say that a and b are duplicates, because they have exactly the same perfectly natural properties. This is because Lewis takes *being a quark* to be perfectly natural, but takes *being north of x* and *being south of x* to be properties that are not perfectly natural. Adopting Deflationary-Friendly Naturalness, we reach the same result. *being a quark* is a perfectly scientific property, whilst *being north of x* and *being south of x* are not perfectly scientific properties. Hence, we maintain the result that a and b are duplicates on my deflationary-friendly interpretation.

²For this toy example, assume that the world consists of a , b and x only.

We may later discover, on my deflationary-friendly interpretation, that *a* and *b* are not duplicates. This is because it may transpire that *being a quark* is not a perfectly scientific property after all – we may ‘break down’ quarks into more fundamental simples. In this instance, presumably we also find that *a* and *b* each exemplify more than two properties: that they exemplify properties corresponding to these more fundamental simples. However, given Lewis takes physics as our best approximation of the perfectly natural properties, he would also be motivated to deny that *a* and *b* are duplicates in this instance. The deflationary-friendly and deflationary-unfriendly interpretations of naturalness thus provide the same set of duplicates across all possible worlds, as desired.

From this, it follows that Deflationary-Friendly Naturalness keeps faith with Intrinsic Properties, Supervenience, Events and Causation. They come ‘for free’ from Duplicates, and we have seen how my deflationary-friendly interpretation delivers the same set of duplicates as a deflationary-unfriendly interpretation.

7.5 Materialism

Materialism is a little more complicated, because of the appeal to alien, natural properties. Lewis (1983) is anxious to refer to alien, natural properties in his characterisation of materialism, so that materialism remains a contingent thesis.³ The thought is that, if two worlds were to differ without differing physically, this is because something radically different is instantiated at those worlds that is not instantiated in the actual world. This allows materialism to remain a contingent thesis, because the actual world *could* have instantiated such properties.

We might be concerned by the appeal to alien, natural properties, because it is difficult to make sense of alien, perfectly scientific properties. A perfectly scientific property is a property referred to by a primitive predicate in the language of ideal science. This seems to rule out the possibility of a perfectly (or relatively) scientific property being alien – if a property is referred to in the language of ideal science, then it is not alien.

³It might be better to call this thesis ‘physicalism’, to avoid an implicit commitment to the existence of matter. However, Lewis (1983) calls the thesis ‘materialism’ and I follow this convention here.

One response to this concern is to abandon the idea that materialism is a contingent thesis. Note that this is not to embrace the claim that materialism must be true: only that, *either* materialism is necessarily true *or* materialism is necessary false. This might not be considered so great a cost for my deflationary-friendly interpretation. However, a small cost is still a *cost*, and I propose that we can do better. An alternative strategy is to make sense of an alien, perfectly scientific property.

To achieve this goal, I appeal to counterfactuals. An alien, perfectly scientific property is a property that *would have been* referred to by primitive predicates in the language of ideal science if the world *had been* substantially different. By Deflationary-Friendly Naturalness, I then propose that a property is an alien, perfectly natural property iff it is an alien, perfectly scientific property. An alien, natural property is then an alien, relatively natural property: a relatively natural property (partly) defined in alien, perfectly natural terms.

This counterfactual understanding of an alien, perfectly scientific property gives no clue as to what an alien, natural property would be like. However, this is consistent with deflationary-unfriendly interpretations of naturalness. Part of the point of an alien property is that it does not admit of examples or an easy grasp on what such a property would be like – otherwise, it would not be *alien*.

Deflationary-Friendly Naturalness thus keeps faith with Materialism.

7.6 Conclusion

Consequently, Deflationary-Friendly Naturalness preserves the majority of theoretical roles proposed for naturalness. It follows that my deflationary-friendly interpretation of naturalness enjoys many of the benefits of deflationary-unfriendly interpretations, but without the costs. A plausible cost-benefit analysis therefore begins to favour Deflationary-Friendly Naturalness.

However, this happy result faces a significant challenge in the next chapter. In this chapter, I have assumed that there is a unique, ideal science. We see that, by challenging this assumption, all the positive results of this chapter are thrown into doubt. This has the potential to be disastrous for Deflationary-Friendly Naturalness. However, in the next chapter, I argue that Deflationary-Friendly Naturalness does at least as well as its rivals when there is no unique

science.

An important point worth remembering throughout Part 2 is that my cost-benefit analysis of Deflationary-Friendly Naturalness is *comparative*. I argued in §6.4 that Deflationary-Friendly Naturalness avoids a cost associated with its rivals, by avoiding metaphysical commitments to claims about the objective structure of the world. As long as it also enjoys all the *same* benefits as its rivals – even if there are *no* such benefits – then Deflationary-Friendly Naturalness is defended as the best interpretation of naturalness.

Chapter 8

The Uniqueness of Ideal Science

8.1 Introduction

In the last chapter, we saw how Deflationary-Friendly Naturalness keeps faith with a variety of naturalness's theoretical roles. So far, I have assumed that there is a unique, ideal science. Though, in §6.3, I conceded that there may be numerous, complete sciences, there I suggested that ideal science is the candidate theory that would be adopted by the consensus of scientists (when our attention is restricted to certain kinds of worlds). In this chapter, I apply more scrutiny to this suggestion and the assumption that there is a unique, ideal science. As we shall see, the cost-benefit analysis in favour of Deflationary-Friendly Naturalness is complicated by these kinds of considerations.

To remind the reader, an ideal science is a complete science adopted by consensus of scientists at the closest world w where:

1. Some complete science is discovered at w .
2. Science progresses at w in a way such that what is referred to as 'science' at w is recognisably the same discipline as what is referred to as 'science' at our world.
3. w shares with our world the best theories.
4. w (broadly) shares with our world the evaluative criteria for determining the best theories.

Let us say that an ‘best-world’ is a world meeting the criteria above. Whether or not there is a unique, ideal science therefore depends on which best-worlds are closest. In this chapter, I consider three scenarios in which ideal science is not unique:

1. There is a unique, closest best-world, but there is no consensus among scientists to adopt a unique theory at that best-world.
2. There are multiple, closest best-worlds, and at each best-world, the consensus of scientists decides on a different complete theory.
3. There is no best-world.

In §8.2, I present the immediate problem for Deflationary-Friendly Naturalness if there is not a unique, ideal science. The problem is that, if there is not a unique, ideal science, the analyses considered in ch.7 become relative to a multitude of distinct theories. This seems to compromise the cost-benefit analysis in favour of Deflationary-Friendly Naturalness over rival interpretations.

The rest of the chapter pushes back on this point. I argue that Deflationary-Friendly Naturalness does at least as well as its rivals. In §8.3, I consider the first two scenarios listed above and motivate their possibility. Depending on how these scenarios are presented, they either pose no threat to Deflationary-Friendly Naturalness’s ‘easy’ theoretical roles, or they are utterly disastrous. However, I argue that Lewis’s deflationary-unfriendly interpretation of naturalness is equally affected across these scenarios. In §8.4, I consider the third scenario listed above and motivate its possibility. Again, my argument is that Deflationary-Friendly Naturalness does at least as well as its rivals across different specific scenarios, once sensible modifications to the meaning of ‘ideal science’ are made. In §8.5, I conclude.

8.2 Complicating Easy Theoretical Roles

The scenarios considered in §8.1 are cases where there are either multiple, ideal sciences, or no ideal science at all.

In the first two scenarios, there are multiple, ideal sciences. In the first scenario, there is a unique, closest best-world. However, scientists do not find consensus on a unique science to adopt. By consensus, they instead adopt a

variety of complete sciences – perhaps for different interests and uses – and each of these theories is an ideal science. Remember that an ideal sciences is simply a complete theory adopted by consensus of scientists in the closest possible best-world to our own.

The second scenario is analogous. There are multiple, closest best-worlds. At each such best-world, a consensus of scientists decides on a distinct, complete theory. Each of these theories is therefore an ideal science. Each are complete theories adopted by the consensus of scientists in a closest possible best-world to our own.

The third scenario presents a case where there is no ideal science. There is no best-world, so there is no complete theory adopted by the consensus of scientists in the closest possible best-worlds to our own.

These results impact on the cost-benefit analysis for Deflationary-Friendly Naturalness. In ch.7, I argued that Deflationary-Friendly Naturalness keeps faith with a variety of ‘easy’ theoretical roles. By ‘keep faith’, I mean that the concepts analysed by naturalness in these theoretical roles are coextensive across different interpretations of naturalness: that the extensions provided by Deflationary-Friendly Naturalness are identical to the extensions provided by Lewis. However, if there is no unique, ideal science, this result is put into doubt.

Consider duplication. By Duplicates, two individuals a and b are duplicates iff they instantiate exactly the same perfectly natural properties. However, if there is no unique, ideal science, then there is no unique set of perfectly natural properties. Suppose that there are multiple ideal sciences. It seems possible that a and b can be duplicates relative to one ideal science, but fail to be duplicates relative to another ideal science. Given that Lewis’s deflationary-unfriendly interpretation of naturalness does not render duplication’s extension relative to theory, the extension of duplication given by Deflationary-Friendly Naturalness is distinct from the extension of duplication given by Lewis.

Similarly, suppose that there is no ideal science. This result is more disastrous for Deflationary-Friendly Naturalness. As there is no ideal science, there are no perfectly natural properties. It follows that all objects trivially instantiate exactly the same perfectly natural properties. By Duplicates, this means that all objects are duplicates of one another. This provides an extension for duplication that is both utterly inadequate, and entirely distinct from

the extension of duplication given by Lewis.

Meanwhile, as noted in §7.4, many of the theoretical roles for naturalness analyse concepts in terms of duplication. When we adopt Deflationary-Friendly Naturalness, these issues are inherited across these theoretical roles.

As noted, this complicates the cost-benefit analysis in favour of Deflationary-Friendly Naturalness. At best, Deflationary-Friendly Naturalness appears to diverge from its rivals in the extensions it provides of duplication and related notions. This means that it is no longer obvious that it enjoys all the same theoretical benefits as its rivals. At worst, Deflationary-Friendly Naturalness offers inadequate extensions of duplications and related notions. This suggests that Deflationary-Friendly Naturalness fails to enjoy some of the theoretical benefits as its rivals.

This puts into doubt the arguments of ch.7, and appears quite disastrous for Deflationary-Friendly Naturalness. However, I propose that things are not as bad as they first appear for my interpretation.

8.3 No Unique Consensus

In §8.1, I offer three scenarios where there fails to be a unique, ideal science. The first two types of scenario can be grouped, because they are both kinds of cases where there is a failure of *consensus*.

Neither kind of scenario is particularly implausible. In the first, there is a unique, closest best-world where a number of complete sciences are discovered. However, at this world, there is no consensus among scientists to adopt a unique theory. This could be the case if the different, complete sciences heavily overlap. If they overlap, there may be no particular need to decide upon one theory as *the* theory of science.

In the second, there are multiple, closest best-worlds where complete sciences are discovered. Perhaps we can imagine that all the closest best-worlds are such that substantial, social pressure prompts scientists to agree on a unique theory. However, there is no reason to presume that consensus will not settle on a different ideal science at each closest best-world.

Hence, we cannot rule out these types of scenario as implausible or impossible. If things are optimal, then there is one closest best-world, and at this best-world, consensus leads scientists to adopt a unique, complete theory. This

provides a unique, ideal science. However, there is no reason to presume things are optimal as described.

On the other hand, I propose that Deflationary-Friendly Naturalness does at least as well as its rivals in these kinds of scenarios. To evaluate this, I consider a number of sub-scenarios, depending on how lucky we are regarding the complete sciences that are available at the closest best-worlds. In each sub-scenario, I argue that Deflationary-Friendly Naturalness does at least as well as Lewis's interpretation of naturalness.

An important point running through this chapter concerns Lewis's epistemology for naturalness. As detailed in ch.6, Lewis treats fundamental physics as our guide to which properties are perfectly natural. He states that 'physics is relevant because it aspires to give an inventory of natural properties – not a complete inventory, perhaps, but a complete enough inventory to account for duplication among actual things' (Lewis 1983, 356-7). This suggests that a complete, fundamental physics would provide a *complete* inventory of perfectly natural properties.

Furthermore, insofar as our *actual*, fundamental physics is a guide to naturalness, this suggests that Lewis should be most interested in a complete, fundamental physics discovered at the closest worlds meeting our restrictions. If a complete, fundamental physics discovered at a very distant world provided the correct, complete inventory, Lewis would have little reason to think that our actual, fundamental physics is even a *guide* to naturalness. This is because our actual, fundamental physics may not at all resemble a complete, fundamental physics at some distant world. By restricting our attention to the *closest* world – which also shares its best theories with our world – we focus on the same worlds that Lewis should be concerned with

Consequently, this suggests that Lewis should have similar concerns about which complete, fundamental physics are discovered at the closest best-worlds. I make use of this point in what follows.

We are Maximally Lucky

If we are maximally lucky, then there is a unique, complete science adopted by consensus of scientists at the closest best-world(s). This means that there is a unique, ideal science.

To assume that we are maximally lucky is to assume that the three scenarios laid out in §8.1 do not reflect reality. Hence, on the assumption that we are maximally lucky, Deflationary-Friendly Naturalness does not render naturalness relative to multiple theories. This avoids the problems discussed in §8.2.

Similarly, when we are maximally lucky, Lewis's interpretation of naturalness operates smoothly as well. If there is a unique, ideal science, then this is presumably the science that provides a complete inventory of the perfectly natural properties. This provides a clear extension for duplication and other concepts by the theoretical roles considered in ch.7.

Unfortunately, there is no guarantee that we *are* maximally lucky in the way described. We might be relatively lucky, or we might be unlucky.

We are Relatively Lucky

We might measure our luck as a function of various concerns. For example, it might be partly measured by the *number* of candidate theories that are adopted by consensus at the closest best-worlds, where the fewer the number, the luckier we are. Additionally, an important measure of our luck is how *similar* the favoured candidates are, with respect to their ontology. If we are relatively lucky, the ideal sciences will not say dramatically different things about what exists.

There are reasons to think that we might be relatively lucky. Given that we are restricting our attention to best-worlds, we are concerned with worlds that share best theories with our world. It is plausible that the ideal sciences at those worlds have very similar ontologies.

Suppose, then, that we are relatively lucky. There are not many ideal sciences, and they are very similar with regard to their ontologies. Lewis faces an epistemological problem of knowing which properties are perfectly natural, because he does not know which ideal science gives the correct inventory of perfectly natural properties. However, he may nonetheless know the extension of duplication. This is because distinct, ideal sciences can provide the same set of duplicates, but provide different reasons for *why* two individuals are duplicates.

Following an example given by Button (unpublished), suppose that we are relatively lucky, and the choice at all closest best-worlds is between two ideal

sciences, RGB and HSL. Both theories agree that there are properties corresponding to colours, that there are properties of Redness, Greenness and Blueness, and that there are properties of Hue, Saturation and Luminance. However, RGB treats the properties of Redness, Greenness and Blueness as perfectly natural, and HSL treats the properties of Hue, Saturation and Luminance as perfectly natural.

Suppose we have what Button might call a ‘Rainbow World’, which consists just of spacetime points, each of which has exactly one colour. Suppose that spacetime points a and b are both in this Rainbow World, and are both a particular shade of orange. They both exemplify the same properties of Redness, Greenness and Blueness. Further, they both exemplify the same properties of Hue, Saturation and Luminance.

According to RGB, a and b are duplicates because they exemplify the same properties of Redness, Greenness and Blueness. According to HSL, a and b are duplicates because they exemplify the same properties of Hue, Saturation and Luminance. The two theories disagree on *why* a and b are duplicates, but agree on the extension of duplication.

If we are relatively lucky, then the ideal sciences form this kind of case. On this assumption, the ideal sciences are definitionally equivalent, in the sense that the primitives of one theory can be defined in the other theory, and vice versa. They agree extensionally and intensionally, but differ hyperintensionally. In this case, Lewis does not know which properties are perfectly natural – he does not know whether it is RGB or HSL that provides the correct inventory of perfectly natural properties – but he can give a definitive extension to duplication nonetheless. This situation is inherited across the theoretical roles that rely on Duplicates. If we are relatively lucky, the benefits of these theoretical roles are therefore preserved for Lewis.

However, the case is analogous with those adopting Deflationary-Friendly Naturalness. If we are relatively lucky, then the complete sciences that are adopted by scientists at the closest best-worlds are few in number, and all have very similar ontologies. Unlike with Lewis, this does not raise epistemological issues with naturalness, but instead renders naturalness relative to distinct theories. In the example given, and by Deflationary-Friendly Naturalness, naturalness itself is relative to our choice between RGB and HSL. On the other hand, as with Lewis, the deflationary-friendly interpretation offers a unique

extension for duplication. Duplication, relative to RGB or relative to HSL, has the same extension. This provides a unique notion of duplication that avoids the costs for Deflationary-Friendly Naturalness discussed in §8.2, a good state of affairs that is inherited across the theoretical roles that rely on Duplicates.

Consequently, when we are relatively lucky, the theoretical roles considered in ch.7 are preserved on any interpretation of naturalness. Both Deflationary-Friendly Naturalness and its rivals enjoy the same benefits from these theoretical roles. So far, my uncomplicated cost-benefit analysis is preserved.

We are Unlucky

However, we may not be relatively lucky either. If we are unlucky, the situation becomes disastrous for both Lewis and those adopting my deflationary-friendly interpretation.

Suppose that we are unlucky. The ideal sciences are many in number, and they present remarkably different ontologies.

If this is the case, then Lewis is not in a position to even guess at which of these theories provides the correct inventory of perfectly natural properties. It follows that he cannot even guess at which properties are perfectly natural. By Duplicates, this means that he cannot even guess at which individuals are duplicates.

The situation for those adopting Deflationary-Friendly Naturalness is not much better. If we are unlucky, then there are many ideal sciences with remarkably different ontologies. According to Deflationary-Friendly Naturalness, naturalness (and thus duplication) is relative to the choice of ideal science. This renders duplication and associated concepts *highly* relative. If there are enough ideal sciences, the extensions become so variable relative to theory that we might start to doubt that these concepts really form cohesive notions at all.

I propose that this situation is disastrous for both Lewis and me, but in different ways. Those adopting my deflationary-friendly interpretation face a situation where they possess a concept of duplication, but its extension differs wildly relative to a multitude of theories. In this case, we might think that Deflationary-Friendly Naturalness's analysis of duplication is extensionally inadequate. Hence, the theoretical roles of Duplication and its related roles are unsuccessful in these conditions, and confer no theoretical benefits to Deflationary-Friendly Naturalness.

Lewis does not face this problem of extensional inadequacy when we are unlucky. However, he achieves this only at the cost of providing no real analysis of duplication at all. Duplication seeks to analyse duplication in terms of perfectly natural properties. However, when we are unlucky, Lewis cannot even guess at which properties are perfectly natural. Hence, the ‘analyses’ offered by Duplicates and its related roles are entirely uninformative. It follows that Duplicates and its related roles confer no theoretical benefit to Lewis’s interpretation of naturalness.

Lewis might object that Duplicates is not *entirely* uninformative when we are unlucky: it tells us that two individuals are either duplicates, or they are not duplicates, and there is no in-between. This might be important across other, related, theoretical roles. Consider Materialism. When we are unlucky, Lewis can nonetheless say that materialism is either true or false. It is just that whether materialism is true is unknowable. By contrast, Deflationary-Friendly Naturalness provides the result that the facts of the matter as to whether materialism is true are theory-relative. Further, it may be that some metaphysician can prove some important claim p from the assumption that materialism is true or materialism is false. This confers a substantial benefit for Lewis’s interpretation of naturalness.

However, we can challenge this point. Our considered metaphysician reasons as follows, when ‘ M ’ expresses the truth of materialism, and ‘ p ’ is some important metaphysical claim:

- | |
|---------------------------|
| 1. $M \vee \neg M$ |
| 2. $M \rightarrow p$ |
| 3. $\neg M \rightarrow p$ |
| — |
| 4. p |

However, the deflationist – relative to *any* ideal science – can simulate the same reasoning. Hence, the result that p can be agreed upon by everyone, non-relative to ideal science. With this in mind, it is not obvious that the relativisation to ideal science imposes any cost here.

Hence, we see that Deflationary-Friendly Naturalness and Lewis’s interpretation both meet with equal disaster – when we are unlucky. This preserves the cost-benefit analysis in favour of Deflationary-Friendly Naturalness, because,

if we are unlucky, Deflationary-Friendly Naturalness still enjoys all the *same* benefits as its rivals.

This completes my overview of the ways in which the first two scenarios can come about. Across them all, I argue that Deflationary-Friendly Naturalness does at least as well as Lewis's interpretation. If we are lucky or relatively lucky, then Duplicates is successful on both interpretations. Otherwise, both interpretations face trouble. As noted earlier and in §6.3, a number of other theoretical roles for naturalness follow from Duplication. They inherit the same situation.

8.4 No Best-Worlds

In the third scenario presented in §8.1, there are no best-worlds: no possible worlds where a complete science is discovered. By the letter of Deflationary-Friendly Naturalness, my interpretation would say that there are no perfectly natural properties in such a scenario. As noted in §8.2, this is disastrous for Deflationary-Friendly Naturalness.

A better approach is therefore to modify what is meant by 'ideal science'. The thought is that we relax the restriction regarding the discovery of some complete science at best-worlds. Call this the 'completeness restriction'. This allows there to be some best-worlds in the scenario we are considering. However, the appropriate modification depends on the way this scenario is realised. I consider the following cases:

1. There exists some *most* complete sciences at some worlds.
2. There exists no most complete sciences at some world, but there is a continuous scale of increasingly complete sciences across worlds.
3. There exists no most complete sciences at some world, and there is not a continuous scale of increasingly complete sciences across worlds.

I argue that the first two realisations of the third scenario are such that straightforward modifications of the completeness restriction are available. These modifications prevent there from being no ideal sciences. Meanwhile, if the third realisation reflects reality, then this is disastrous for Deflationary-Friendly Naturalness. However, I argue that it is equally disastrous for Lewis's deflationary-unfriendly interpretation of naturalness. This means that Deflationary-Friendly

Naturalness does at least as well as Lewis's interpretation across these scenarios, protecting my cost-benefit analysis.

As before, I rely on Lewis's epistemology for naturalness, which is reliant on approximating some complete theory of fundamental physics.

For readability, it will be helpful to abbreviate 'worlds meeting our restrictions 2-4' as 'best*-worlds'. As such, a best*-world w may or may not be such that a complete science is discovered at w . However, a best*-world w is such that

2. Science progresses at w in a way such that what is referred to as 'science' at w is recognisably the same discipline as what is referred to as 'science' at our world.
3. w shares with our world the best theories.
4. w (broadly) shares with our world the evaluative criteria for determining the best theories.

There are Some Most Complete Sciences Discovered at Some Best*-Worlds

In the first case, there is no complete science discovered at any best*-world, but there are some sciences discovered at some best*-worlds such that no other theory at any other best*-world is more complete. For example, there might be principled limitations on what can be known, thus preventing scientists discovering a complete science in any best*-world. However, this means that we can have sciences up to this limit, forming the set of most complete sciences, and the best*-worlds where they are discovered.

If we inhabit this kind of scenario, then the sensible modification for the completeness restriction is as follows:

- 1a. The most complete science discovered (among all best*-worlds) is discovered at w .

This avoids there being no ideal sciences. It may be that there are multiple ideal sciences. This occurs if there are multiple, most complete theories adopted by the consensus of scientists at the closest best-worlds. However, these cases are analogous to those discussed in §8.3. There, it is shown that

Deflationary-Friendly Naturalness does at least as well as Lewis's interpretation of naturalness.

There is a Continuous Scale of Increasingly Complete Sciences Discovered across Best*-Worlds

In the second case, there is no complete science discovered at any best*-world, nor is there a most complete science discovered at any best*-world. Instead, there is an infinite chain of increasingly complete sciences across best*-worlds where they are discovered. This scenario might come about if every possible best*-world suffers a mass extinction event. If the completeness of science is simply limited by time, it may be that science becomes more complete the later the mass extinction event at that best*-world is.

If we inhabit this kind of scenario, then we should amend our notion of ideal science in terms of the *limit* of this continuous scale, and eliminate the completeness restriction entirely. We say that

Ideal science is a complete science adopted by consensus of scientists at the (closest) limiting case(s) of this continuous scale of worlds w_1, w_2, \dots

when

- 2a. Science progresses at each of w_1, w_2, \dots in a way such that what is referred to as 'science' at each of w_1, w_2, \dots is recognisably the same discipline as what is referred to as 'science' at our world.
- 3a. Each of w_1, w_2, \dots shares with our world the best theories.
- 4a. Each of w_1, w_2, \dots (broadly) shares with our world the evaluative criteria for determining the best theories.

Again, this avoids there being no ideal sciences in this kind of scenario. There may be multiple ideal sciences, but these cases are handled by §8.3, where it is shown that Deflationary-Friendly Naturalness does at least as well as Lewis's interpretation of naturalness.

There is No Most Complete Science Discovered at Some Best*-World, and No Continuous Scale of Increasingly Complete Sciences Discovered across Best*-Worlds

In the third and final case, Deflationary-Friendly Naturalness encounters significant difficulty. There is no most complete science discovered at some best*-world, so I cannot relax the completeness restriction in terms of *most complete* theories. Nor is there a continuous scale of increasingly complete sciences discovered across best*-worlds, so I cannot appeal to the idea of a *limit* on these best*-worlds. This scenario might come about if every possible best*-world suffers a mass extinction event, science becomes more complete over time at each best*-world, and science is characterised at each world by periods of scientific revolution, in which science dramatically changes.¹

In this scenario, Deflationary-Friendly Naturalness faces disaster. There is no ideal science, and thus no set of perfectly natural properties. By Duplicates, all individuals are duplicates: a disastrous result. This situation is inherited across the related, theoretical roles for naturalness, such that Deflationary-Friendly Naturalness seems to constitute no theoretical benefit whatsoever.

Fortunately, it is plausible that Lewis's interpretation of naturalness faces analogous disaster in this scenario. In this scenario, no complete fundamental physics is discovered at any best*-world, so it is metaphysically impossible to discover the correct (complete) inventory of perfectly natural properties. Moreover, because science is characterised by periods of scientific revolution, our current fundamental physics is unlikely to much resemble the fundamental physics that provides the *most complete* inventory of perfectly natural properties. Hence, Lewis cannot even approximate at which properties are perfectly natural.

It follows that Duplicates is entirely uninformative: Lewis cannot even guess which properties are perfectly natural, so cannot even guess which individuals are duplicates. This situation is inherited across all related, theoretical roles.

We therefore face a scenario in which Lewis's interpretation of naturalness renders naturalness entirely uninformative and mysterious, and my interpretation of naturalness provides an empty set of perfectly natural properties. Both interpretations – in this scenario – are utterly unsuited for their theoret-

¹À la Kuhn (1970).

ical roles, and cannot enjoy any benefits from them. However, Deflationary-Friendly Naturalness still enjoys the *same* benefits as Lewis's interpretation.

If naturalness is to play any theoretical roles on any interpretation, we had better hope that we are not in this kind of scenario. On the other hand – disastrous though they are – such scenarios do not threaten my *comparative* cost-benefit analysis in favour of Deflationary-Friendly Naturalness.

8.5 Conclusion

I am in a position to conclude my discussion regarding the uniqueness of ideal science.

If things are optimal, then there is a unique, ideal science. There is a unique, closest best-world and scientists adopt a unique, complete theory by consensus at that world. However, this chapter has raised the point that we cannot take this optimal situation for granted.

I have considered a number of scenarios that range from unproblematic to disastrous for Deflationary-Friendly Naturalness. However, where a scenario has been disastrous, I have argued that Lewis's interpretation of naturalness faces an equally disastrous, *epistemic* problem. Though the problems facing each interpretation are distinct, they are plausibly equally bad. Hence, Deflationary-Friendly Naturalness does at least as well as its rivals in a cost-benefit analysis. This allows me to bracket concerns about the uniqueness of ideal science in this thesis.

However, it is worth taking a moment to consider just how disastrous some scenarios are for naturalness theorists. It may be that naturalness theorists are making pivotal assumptions about how lucky we are, or which best*-worlds are closest, upon which their entire metaphysics depend. At best, these assumptions require defence. At worst, the entire idea of there being natural properties rests upon a foundation of sand. I leave this as a speculative concern that may merit a future project.

Chapter 9

Mental Content

9.1 Introduction

This chapter considers a theoretical role for naturalness that is incompatible with Deflationary-Friendly Naturalness: Mental Content. If this theoretical role constitutes a theoretical benefit to deflationary-unfriendly interpretations of naturalness, then this threatens the cost-benefit analysis in favour of Deflationary-Friendly Naturalness. I therefore seek to show that Mental Content fails to confer any theoretical benefit on any interpretation of naturalness. This protects my cost-benefit analysis, because it defends the claim that Deflationary-Friendly Naturalness enjoys all the same benefits as its rivals.

Mental Content groups two related roles for naturalness. The first role is to mount an objection to Putnam's (1981) permutation arguments, and the second is to meet Kripke's (1982) rule-following paradox. I group the two roles in Part 2 because they work in essentially the same way. Lewis's (1983) thought is that naturalness acts as an objective constraint on reference:

Mental Content: The content of an intentional state is constrained by what is natural.

I consider Putnam's permutation arguments in §9.2-§9.4. In §9.2, I explain Putnam's argument and Lewis's appeal to naturalness in response. In §9.3, I explain why deflationary-friendly interpretations of naturalness are incompatible with this role. To meet this problem, I argue that this theoretical role is problematic for *any* interpretation of naturalness, in §9.4. In §9.5-§9.7, I

consider Kripke’s rule-following paradox. The structure of this discussion is analogous. First, I introduce what is at issue, in §9.5. In §9.6, I show that the deflationary-friendly interpretation makes naturalness unsuited to meeting Kripke’s paradox. In §9.7, I argue that this theoretical role is problematic for any interpretation of naturalness. Finally, §9.8 concludes.

9.2 Putnam’s Permutation Arguments

Putnam (1981) demonstrates, as Button puts it, that ‘any theory with a non-trivial model has many distinct isomorphic models with the same domain’ (Button 2013, 15). From this, it seems to follow that reference is indeterminate. It is to this problem that Lewis (1983) applies naturalness. To fully appreciate the problem Putnam raises, and Lewis’s response, it is helpful to consider Lewis’s theory of interpretation more generally.

Lewis (1984) argues that the *correct* interpretation is one that best balances *fit* with *eligibility*. Williams (2011) explains what fit consists in. First, we pair sentences with their truth-conditions, to form a *pairing-list*. We might discover these truth-conditions by observing a community’s linguistic behaviour: for example, when they are prepared to affirm a sentence and when they are not. A semantic theory *fits* iff it assigns semantic values to sentences that match the pairings on the pairing-list.

We can make fit more or less complex by stipulating what it means to *match* the pairings on the pairing-list. Williams suggests that, ‘to keep things simple, let’s understand ‘Fit’ in the most naïve fashion as the requirement that the semantic theory predicts a pairing of sentences and contents that exactly matches those that appear on the target list’ (Williams 2011, 3). He notes that Lewis (1975) provides more sophisticated elaborations of fit.

With Lewis’s theory of interpretation in mind, Putnam’s permutation argument shows that fit alone fails to uniquely select the correct interpretation. Suppose that the target of Putnam’s argument has an ideal theory – one that exemplifies all the theoretical virtues and makes predictions consistent with all observable facts (it is ‘empirically adequate’). This theory has many, distinct, isomorphic models. As they are isomorphic, we cannot single out which unique model we are using by appealing to fit alone. Hence, if fit exhausts our interpretative constraints, it is massively indeterminate which model we are using.

Worse yet, the different models say wildly different things. Reference itself seems indeterminate.

This is why Lewis (1984) takes the correct interpretation to be the semantic theory that best balances fit with eligibility. The eligibility of a theory is the degree to which its predicates refer to natural properties. This rules out many permutations, drastically reducing the indeterminacy we have to deal with.

We can demonstrate these ideas with a toy example about two cats, Miaomi and Celly, and one human, Laura. Consider the following model:

Domain:

{Miaomi, Celly, Laura}.

Constants:

a: Miaomi

b: Celly

c: Laura

Predicates:

Fx: *x* is a cat.

Gx: *x* is a human.

It follows that

Fa, *Fb*, $\neg Fc$, $\neg Ga$, $\neg Gb$ and *Gc*.

Putnam points out that we can offer isomorphic permutations on this model. One such permutation is as follows:

Domain:

{Miaomi, Celly, Laura}.

Constants:

a: Laura

b: Celly

c: Miaomi

Predicates:

Fx: *x* is a cat and $x \neq \text{Miaomi}$, or $x = \text{Laura}$.

Gx: $x = \text{Miaomi}$.

It follows, as before, that

$$Fa, Fb, \neg Fc, \neg Ga, \neg Gb \text{ and } Gc.$$

For each model, we use Robinson's diagram lemma to provide names for each element of the model. It follows that the two models are indistinguishable by the truth-value of their atomic sentences, and thus by the truth-value of their non-atomic sentences as well. The concern is that regardless of our *intention* to apply the first interpretation, there is no way of telling that we are not working with the second. The problem intensifies, because we can offer many more isomorphic interpretations. This makes reference indeterminate, because saying '*Fa*' says something different depending on the interpretation.

This is where Lewis's response comes in. Both models equally fit. However, the first is more eligible than the second. This is because the properties *being a human* and *being a cat* are more natural than the properties *being a cat that is not Miaomi*, or *being Laura* and *being Miaomi*. Hence the first interpretation is better than the second.

This application of naturalness helps to wean out the correct interpretation from its permutations. The isomorphic models equally fit, but some are more eligible than others. Hence, the best balance of fit and eligibility favours the model that is more eligible, and selects it as the *correct* interpretation.

Putnam (1984) responds to Lewis with his 'just-more-theory' manoeuvre. The thought is that our theory of which properties are natural is just more theory, which is susceptible to permutation. Hence the reference of 'perfectly natural' or 'relatively natural' is indeterminate. It follows that naturalness cannot constrain reference unless we already have a solution to Putnam's argument.

However, this argument is criticised as question-begging. Lewis argues that it is not the *theory* of natural properties that constrains reference, but instead the theory-independent, natural properties themselves. The thought is that these properties constrain reference before we have a theory of their naturalness. Hence, it is question-begging to say that it is indeterminate which model of naturalness theory we are using: this assumes that those natural properties have already failed to constrain reference.

This, then, is the theoretical role for naturalness in meeting Putnam's permutation argument.

9.3 Putnam's Permutation Argument and Deflationary-Friendly Naturalness

Deflationary-Friendly Naturalness is unsuited for this theoretical role. This is because my interpretation offers the naturalness theorist no defence against the just-more-theory manoeuvre.

Deflationary-Friendly Naturalness equates the perfectly natural properties with the perfectly scientific properties. The latter are those properties referred to by primitive predicates in a theory of a complete science. To determine which properties are perfectly natural, we therefore must interpret a theory of a complete science. However, this is straightforwardly *just more theory*.

Consider again Lewis's (1984) response to the just-more-theory manoeuvre. He argues that it is not the *theory* of naturalness that constrains reference, but the natural properties themselves. Suppose I made an analogous response, working with Deflationary-Friendly Naturalness. The argument is that it is not the theory of a complete science (that determine which properties are natural) that constrains reference, but the natural properties themselves.

This argument is problematic. This is because theories of complete sciences don't simply *discover* which properties are perfectly scientific (and thus perfectly natural). Instead, they *determine* which properties are perfectly natural. This is a disanalogy with deflationary-unfriendly interpretations of naturalness. Lewis can claim that our theories help discover which properties are perfectly natural – it is an objective, theory-independent fact which properties are perfectly natural. Deflationary-Friendly Naturalness is incompatible with this kind of claim. It is *not* an objective, theory-independent fact which properties are perfectly natural: otherwise the interpretation would fail to be *deflationary-friendly*.

Consequently, Putnam's (1984) just-more-theory manoeuvre does not beg the question when applied against Deflationary-Friendly Naturalness. Hence, Deflationary-Friendly Naturalness cannot play this theoretical role.

We want to make the cost-benefit analysis between interpretations of naturalness as straightforward as possible. Therefore, we want Deflationary-Friendly Naturalness to enjoy the same theoretical benefits as other interpretations (but with fewer costs). We see that Deflationary-Friendly Naturalness cannot enjoy this theoretical benefit. As such, I make the argument

that deflationary-unfriendly interpretations of naturalness cannot enjoy this theoretical benefit either.

9.4 Problems with Lewis's Response to Putnam

In this section, I consider a dilemma affecting Lewis's response to Putnam. It shows that deflationary-unfriendly naturalness fails to enjoy a benefit that Deflationary-Friendly Naturalness does not.

The dilemma's structure is as follows. On the first horn, I assume that Lewis is committed to a form of realism known as 'external realism', and with it the credo of Cartesianism. This commits Lewis to the idea that an ideal theory might be radically false. The next subsection argues that, on the assumption of Cartesianism, appeals to naturalness fail to meet Putnam's permutation argument.

On the second horn, I assume that Lewis is not committed to external realism. As Putnam's target is the external realist, it follows that naturalness plays no theoretical role in defending against Putnam's permutation argument. However, the Lewisian might insist that naturalness plays *some* role in fixing reference. The second subsection argues that appealing to naturalness fails to explain much about how reference is fixed. It follows that this theoretical role fails to confer any theoretical benefits to naturalness.

The First Horn: Button and the Just-More-Theory Manoeuvre

On the first horn, Lewis is committed to a particular form of realism: external realism. The following discussion is owed to Button (2013) and his defence of the just-more-theory manoeuvre.

Button emphasises that the just-more-theory manoeuvre must be taken seriously by a *particular kind* of realist, and that this kind of realist is the target of Putnam's permutation arguments. Button argues that the just-more-theory manoeuvre is defensible on the following three assumptions, adopted by the *external realist*: Independence, Correspondence and Cartesianism:

Independence: The world is (mostly) made up of mind-, theory and language-independent things.

Correspondence: Truth involves some unique correspondence relation between words etc. and external things etc.

Cartesianism: An ideal theory might be radically false.

Button links Cartesianism with a more general commitment to the 'bracketing' of appearances from what is true. Button writes that

the external realist generically worries about nightmarish Cartesian sceptical hypotheses. These essentially come down to the following worry: a theory could get everything right with regard to appearances and still be undetectably and radically false. In order to have this worry, the external realist must think that it is possible to consider appearances whilst somehow *bracketing* away their reference, designation, correspondence and so forth. That is, she is happy to talk about bracketed appearances herself (Button 2013, 46).

Suppose that the external realist characterises 'appearances' in terms of direct, empirical evidence.¹ For such an external realist, Cartesianism constructs a border between what has empirical content and what does not. The ideal theory – one that maximally meets the theoretical virtues, and is empirically adequate – demarcates the boundary of empirical content: what is confirmable by the empirical evidence that is available. Cartesianism is the thesis that our ideal theory might be radically false. The thought is that all available, empirical evidence could be the trick of some evil daemon, or the hallucination of a brain in a vat. Button frames his defence of Putnam's just-more-theory manoeuvre around this commitment to Cartesianism. It is thus of vital importance that the target of Putnam's argument is the external realist.

Button constructs a dilemma for the external realist. The Lewisian external realist appeals to objective (and therefore theory-independent) naturalness as a constraint on reference. However, because Cartesianism draws a border between our ideal theory and objective reality, we can construct the following dilemma. Either the claim that naturalness constrains reference is part of the

¹Button (2013) notes that the external realist can characterise 'appearances' in a number of ways. However, he demonstrates that Putnam's arguments apply against any kind of 'veil' the external realist constructs. The basic point is that each form of bracketing separates the ideal from the true. For sake of simplicity, I focus on the typical case of the 'bracketed empiricist'.

ideal theory, or it is not. If it *is* part of the ideal theory, then the just-more-theory manoeuvre against appeals to naturalness cannot be accused of question begging. The claim that naturalness constrains reference is explicitly part of the theory, and thus liable to permutation.

On the other horn of the dilemma, the claim that naturalness constrains reference is not part of the ideal theory. However, the ideal theory demarcates the limits of empirical content. Hence, the idea that naturalness constrains reference lacks empirical content. To appeal to naturalness as a constraint on reference is to appeal to magic.

The external realist might seek to bite the bullet, and accept Putnam's permutation argument as presenting just one more sceptical scenario. The thought is that Cartesianism already commits the external realist to accepting the possibility of various sceptical scenarios, and that Putnam's is just another form of scepticism worth considering. Given that the external realist is used to other forms of scepticism, the risk of accepting another should not lead them to abandon external realism.

Button's response is that this new form of *semantic*, sceptical doubt is paradoxical. To express scepticism about successful reference is paradoxical, because we are relying on successful reference to express scepticism about successful reference.

The external realist, therefore, cannot appeal to semantic scepticism without their position collapsing into coherence. Button (2013, 57) argues that Putnam's arguments 'act as a machine that converts Cartesian angst into Kantian angst'. Cartesianism commits the external realist to a bracketing of the world, between ideal theory and truth. If the claim that naturalness constrains reference is part of the ideal theory, then the just-more-theory manoeuvre is not question-begging. If the claim is not part of the ideal theory, then appealing to naturalness is like appealing to magic – it lacks empirical content. Meanwhile, the external realist cannot bite the bullet and accept semantic scepticism, because that collapses their position into paradoxical incoherence.

The appeal to naturalness as a constraint on reference therefore fails against Putnam's permutation argument.

In response to Button's dilemma, the external realist may make the following, transcendental argument:

1. Our thoughts express claims about the world.

2. For this to be possible, something must constrain reference.
3. Something fixes reference.

However, there are severe limitations with this argument. Firstly, there are reasons to doubt that the second premise is true. Remember that Putnam's argument applies directly to an *external realist*. Other theories, realist or otherwise, aren't susceptible to Putnam's argument. Hence, we can abandon external realism rather than commit ourselves to some constraint on reference.

Secondly, as Button notes, the conclusion of this transcendental argument is very weak. All it allows the external realist to assert is that '*something (one knows not what) fixes reference*' (2013, 62). By Cartesianism, this 'something' – unspecified and thus not part of the ideal theory – lacks empirical content. Hence, it is an appeal to magic.

Thirdly, and perhaps most directly relevant to this thesis, the transcendental argument does not find a theoretical role for naturalness. The argument does not establish that *naturalness* constrains reference: only that *something* does. Consequently, if the external realist makes this argument, appeals to naturalness are redundant.

This undermines the theoretical role for naturalness in meeting Putnam's permutation argument. Appealing to naturalness does not help the external realist in meeting Putnam's permutation argument. Lewis can accuse the just-more-theory manoeuvre of question-begging, but only if he is willing to abandon external realism. Specifically, Lewis must reject the commitment to Cartesianism. However, once external realism is rejected, then appeals to naturalness against Putnam's arguments are no longer required.

The Lewisian might respond that naturalness *contributes something* to reference. They might concede that appeals to naturalness are not *required* to meet Putnam's permutation argument, but contend that the 'something' that fixes reference is naturalness. The next subsection undermines the theoretical benefits of such claims.

The Second Horn: Naturalness as Unexplanatory

On the second horn, I assume that Lewis is not committed to external realism. This abandons any theoretical benefits from defending against Putnam's permutation arguments: which, after all, target the external realist. However,

naturalness may have a theoretical role in explaining how reference is fixed. This subsection argues that this theoretical role fails to confer any theoretical benefits to naturalness.

My argument is based on the fact that Lewis has not yet explained *why* the natural properties constrain reference. The thought is that saying naturalness constrains reference is unexplanatory, and thus confers no theoretical benefit.

Assume, for the time being, that naturalness-constraints on reference adequately meet Putnam's permutation argument. In other words, suppose that *if* our reference is constrained by naturalness, then many permutations are ruled out. This may motivate thinking that naturalness does, *somehow*, constrain reference. However, I propose that Lewis still owes an explanation of how naturalness manages to do so.

Lewis suggests that the relatively natural properties are *reference magnets*. However, this seems dangerously close to simply *renaming* the problem of why naturalness constrains reference. The immediate response is to ask *why* the relatively natural properties are reference magnets.

This forms a dilemma. On one horn, the naturalness theorist offers no explanation of why natural properties are reference magnets. This means that they are appealing to brute fact – that natural properties *just are* reference magnets. This undermines the theoretical utility of appealing to naturalness in the first place. We could instead just appeal directly to reference magnetism and argue that some interpretations are more magnetic than others. This does not appeal to naturalness, because the phenomenon underpinning reference magnetism may be something quite distinct from the phenomenon underpinning, for example, duplication.

For example, suppose that we asked why the predicate 'green' refers to the property of being green, and not the property of being grue. Lewis might respond that the property of being green is a reference magnet and the property of being grue is not. He might add that the property of being green is relatively natural, and the property of being grue is unnatural. However, on the first horn of this dilemma, he declines to explain the connection between reference magnetism and naturalness. My point is that the appeal to naturalness is superfluous in this explanation of why the predicate 'green' refers to the property of being green. Lewis could have stopped once he said that the property *being green* is a reference magnet. It is not clear what explanatory

value is gained by further appealing to naturalness.

On the second horn, the naturalness theorist explains that the natural properties are reference magnets because of some good-making feature that they share. This undermines the theoretical utility of appealing to naturalness, because we could instead just appeal directly to that good-making feature and not mention naturalness at all.

An example will help explain what I mean. Consider the following explanation of why some properties are reference magnets:

How we think and conceptualise is partly determined by our biology and how our brains function. This may be susceptible to evolutionary influences, if it is *better* (for survival) to conceptualise in certain ways. The properties that best correspond to these biological constraints are reference magnets, because they best match with how we organically conceptualise.

I am not wedded to this explanation being true, and I doubt that it is complete (the explanation is likely to be much more complex, and involve socio-linguistic factors). However, I propose that it is not entirely implausible as an explanation of why some properties are reference magnets. The issue is that the explanation doesn't mention naturalness, nor does it need to. Instead, it appeals to the good-making feature of being evolutionarily useful.

Hence, we can just appeal to this good-making feature and not mention naturalness. This provides us with reference magnetism. It follows that we can meet Putnam's permutation argument without bringing in naturalness at all. To demonstrate this point, suppose we adopted the above explanation of reference magnetism. Some properties are reference magnets, such that we organically favour models that fit our biological, conceptual schemes. Permutations that are dramatically at odds with how we organically conceptualise are ruled out, thus greatly diminishing the number of permutations that are available.

The more general worry is that *any* explanation of why some properties are reference magnets introduces a good-making feature that makes naturalness redundant for meeting Putnam's permutation argument. Rather than the good-making feature corresponding to an explanation that *underpins* naturalness-

constraints on reference, it corresponds to an explanation that constitutes an *alternative response* to Putnam.

This completes the dilemma. On the first horn, the naturalness theorist argues that it is brute fact that natural properties are reference magnets. This threatens to make the appeal to naturalness redundant, because if we are not in the business of offering explanations then we might as well appeal directly to reference magnetism. On the second horn, the naturalness theorist explains that natural properties share a good-making feature that makes them reference magnets. This again makes the appeal to naturalness redundant, because we can instead appeal directly to this good-making feature to deliver reference magnetism. Either way, naturalness has no theoretical utility in meeting Putnam's permutation argument.

I conclude that these problems show that this theoretical role constitutes no benefit for positing naturalness, even on a deflationary-unfriendly interpretation.

9.5 Kripke's Rule-Following Paradox

Kripke's paradox, meanwhile, proceeds by noting that whenever we intend to follow a rule, there are multiple interpretations of the rule that equally fit past adherence to the rule. Hence, it is indeterminate which rule we are actually following. As an example, assume person *A* has never performed addition on numbers greater than n .² Her past usage of the '+' symbol, therefore, fits both addition and quaddition, when quaddition is defined as follows:

Quaddition: When all numbers involved in a quaddition are equal to or smaller than n , quaddition is identical to addition. When some number involved in a quaddition is greater than n , the answer = 5.

The paradox, then, is that there is massive indeterminacy with regards to which rule we are following. Kripke argues that various measures that might be mustered to reduce this indeterminacy, such as *intending* to add rather than quadd, are themselves rules that require interpretation. Such measures fall prey to the paradox and so cannot help us escape it.

²For any individual, there is some n such that that individual has never performed addition on numbers greater than n .

As before, Lewis (1983) employs naturalness to provide a constraint on mental content. Our mental content is constrained both by past adherence to the rule (for which addition and quaddition are equally successful) *and* which candidate is most natural (for which addition wins out over quaddition).

We can see that this theoretical role for naturalness closely resembles how naturalness is supposed to meet Putnam's permutation arguments. Lewis suggests that the correct interpretation is that which achieves the best balance of fit and eligibility. Addition and quaddition both fit the speaker's linguistic behaviour equally well, but addition is more eligible than quaddition. Hence, interpreting the speaker as adding, rather than quadding, is the better interpretation.

To draw an even closer analogy, we can make a comparison between Putnam's just-more-theory manoeuvre and what we might call the 'just-more-interpretation' manoeuvre. For example, Kripke might respond that taking naturalness to constrain reference requires following a rule about interpretation, that is:

To select the correct interpretation, select the interpretation that best balances fit and eligibility.

This rule must itself be interpreted, and so is just more interpretation. Hence, we cannot use naturalness to constrain interpretation unless we have already solved the paradox. In response, the Lewisian may accuse the just-more-interpretation manoeuvre as question-begging. The thought is that naturalness *itself* constrains our interpretations, rather than our *interpretation* of rules about naturalness and interpretation. Hence, the just-more-interpretation manoeuvre assumes that naturalness has already failed to constrain interpretation, and is question-begging.

9.6 Kripke's Rule-Following Paradox and Deflationary-Friendly Naturalness

Deflationary-Friendly Naturalness is unsuited to the theoretical role of meeting Kripke's rule-following paradox. It renders naturalness relative to theory. Hence, we need to be able to interpret that theory in order to appeal

to naturalness-constraints on interpretation. It follows that the just-more-interpretation manoeuvre is not question-begging against deflationary-friendly interpretations of naturalness.

For more detail, the reader should refer to §9.3, as the case is entirely analogous.

9.7 Problems with Lewis's Response to Kripke

As with Putnam's permutation argument, Deflationary-Friendly Naturalness is incompatible with this theoretical role in meeting Kripke's paradox. To avoid muddying the waters of our cost-benefit analysis between Deflationary-Friendly Naturalness and its rivals, I must show that deflationary-unfriendly interpretations of naturalness cannot enjoy any benefits from this theoretical role. I consider two problems with Lewis's response to Kripke, both of which mirror problems found with Lewis's response to Putnam in §9.4. These parallels should not surprise us, as naturalness is applied analogously in each case.

Merino-Rajme and the Just-More-Interpretation Manoeuvre

The first problem is raised by Merino-Rajme (2015). There are parallels between Merino-Rajme's argument and Button's (2013) defence of the just-more-theory manoeuvre. However, they are dissimilar enough to justify detailing Merino-Rajme's argument in full.

As with Button, Merino-Rajme argues that Lewis fails to fully appreciate the context in which Kripke's paradox is raised. She argues that the *real* Kripkean paradox is the apparent unavailability of meaning facts that can *guide* a subject:

The Guidance Constraint: 'meaning facts – i.e. facts determining what a subject means by a sign or word – must be constituted by something capable of guiding the subject in applying the sign or word in accordance with what she means by this sign or word' (Merino-Rajme 2015, 169).

Merino-Rajme's point is as follows. Suppose that we are confronted with the puzzle $124 + 235 = x$, and we are told to solve for x . Suppose that we write that $x = 359$. We might have written that $x = 359$ because we were guided by meaning facts about addition. However, we might also have written

that $x = 359$ by random, or due to some causal influences unknown to us. The important intuition is that only the first instance of writing that $x = 359$ – only when we are guided by some meaning facts about addition – is an example of *rule-following*. This motivates something like the guidance constraint.

However, the natural property *being addition* cannot be grasped directly. The property *being addition* is an infinite set of ordered triples $\{ \langle 1, 1, 2 \rangle, \langle 2, 2, 4 \rangle, \dots \}$ and our minds are finite. Hence, Merino-Rajme notes, we either grasp the natural property *indirectly*, or not at all.

Here, we can construct a parallel dilemma to that which Button raises against the external realist. If we grasp the natural property *being addition* indirectly, then we are grasping addition via interpretation. If this is the case, then the just-more-interpretation manoeuvre cannot be accused of question-begging, and the naturalness-constraint fails to meet Kripke's paradox.

Alternatively, if we don't grasp addition indirectly, then we don't grasp addition at all. This is because we cannot grasp addition directly. It follows that the property of being addition cannot *guide* us. Instead, its influence is akin to some causal influence that makes us write that $x = 359$ 'randomly'. Given that this is not what it is to follow a rule, Kripke's paradox remains.

An analogous transcendental argument to that considered in §9.4 might be considered:

1. We follow the rule given by addition.
2. For this to be possible, something must allow us to grasp addition.
3. Something allows us to grasp addition.

Without the commitment to Cartesianism, this transcendental argument is not an appeal to a magical solution. However, it fails to explain what allows us to grasp addition, and what the role for naturalness might be. This forms the basis of the second problem.

Naturalness as Unexplanatory

The second problem is provided by the intuition that Lewis owes us an explanation of *why* the natural properties constrain interpretation. The thought is that it is not satisfactory to say that it is brute fact that the natural properties

act as a constraint on interpretation: there should be something linking those properties directly to how we think and interpret rules.

The argument is analogous to that given in §9.4, so here I only summarise the case. The claim that natural properties constrain interpretation is either brute fact, or admits of explanation. If it is brute fact, then this is unexplanatory and we might as well appeal directly to interpretative constraints. If the claim admits of explanation, then such explanations will assign the natural properties a good-making feature that explains their role in constraining interpretation. This renders the appeal to naturalness redundant, because we could appeal directly to this good-making feature. Either way, it appears that the appeal to naturalness is redundant and of no theoretical benefit.

9.8 Conclusion

It is worth briefly summarising before moving on to another role for naturalness.

I have argued that Deflationary-Friendly Naturalness is incompatible with the theoretical role of Mental Content. However, I have argued that deflationary-unfriendly interpretations of naturalness cannot enjoy any comparative benefit from this theoretical role. This is because it is plausible that appeals to deflationary-unfriendly naturalness are unsuccessful in meeting the problems posed by Putnam and Kripke.

This protects the cost-benefit analysis favouring Deflationary-Friendly Naturalness. If Deflationary-Friendly Naturalness can enjoy the same theoretical benefits of its rivals, but with fewer costs, then a plausible cost-benefit analysis favours it as the *correct* interpretation of naturalness.

Chapter 10

Lawhood

10.1 Introduction

This chapter considers another theoretical role for naturalness that is incompatible with Deflationary-Friendly Naturalness: Law of Nature. As in ch.9, the purpose of this chapter is to defend my uncomplicated cost-benefit analysis in favour of Deflationary-Friendly Naturalness. If Law of Nature constitutes a theoretical benefit to deflationary-unfriendly interpretations of naturalness, then Deflationary-Friendly Naturalness does not enjoy all the same benefits as its rivals. In this chapter, I argue that Law of Nature fails to constitute a theoretical benefit, on any interpretation of naturalness. It follows that Deflationary-Friendly Naturalness enjoys the same benefits as its rivals (but more cheaply), thus protecting my cost-benefit analysis in favour of Deflationary-Friendly Naturalness.

Lewis (1983) proposes that lawhood should be analysed (partly) in terms of naturalness:

Law of Nature: A law of nature is a true generality in our best theory of the world, when competing theories are presented in perfectly natural terms.

This is known as Lewis's *Best Systems Analysis*, or BSA. Note that Law of Nature is an *reductive analysis* of lawhood, rather than simply presenting a coextensional claim about laws. Law of Nature is not merely the claim that the set of laws is identical with the set of true generalities in our best theory

of the world. Instead, it offers an analysis that is purported to offer theoretical benefits: helping to *explain* what lawhood amounts to, by appealing to the notion of our best theory.

In §10.2, I fully explicate the BSA. In §10.3, I argue that Law of Nature is incompatible with Deflationary-Friendly Naturalness. I therefore turn to the project of undermining Law of Nature – and thus the BSA – as a satisfactory account of lawhood. In §10.4, I focus on Woodward’s (2014) argument that appeals to simplicity, whilst justified in the context of ordinary science, are unjustified in the context of the BSA. Furthermore, Woodward raises doubts that the practice of actual scientists is adequately described by a trade-off between simplicity and strength, as the BSA suggests. In §10.5, I propose expansions to Woodward’s arguments. Any appeal to simplicity justified on the basis of tracking truth cannot be justified in the context of the BSA, because the theories being compared in that context are already known to be true. Furthermore, I believe that Woodward’s arguments apply analogously to strength. The consequence is that the BSA seems unscientific and thus unsuited as an analysis of scientific lawhood.

In §10.6, I introduce and address an objection against Woodward’s arguments. This holds that appeals to simplicity are justified in *other* contexts, and that these justifications vicariously apply in the context of the BSA. I argue that we should not identify appeals to simplicity in the context of ordinary science with appeals to simplicity in the context of the BSA, such that a justification of the former cannot vicariously justify the latter. In §10.7, I conclude this chapter.

10.2 The Best Systems Analysis

Lewis (1983) analyses lawhood as generalities in our best theory of the world. The detail of the BSA is in determining which theory is *best*.

In the context of picking the best theory, it is supposed that we have available all non-nomological facts, past, present and future. This is a vital point: there is no non-nomological data yet to be discovered. The candidate theories for best theory should all match this non-nomological data – though some will fail to account for *all* non-nomological facts, all of their theorems are true. In what follows, I describe a theory as true iff all its theorems are.

Hence, when picking the best theory, we are choosing between true theories. The best theory is the candidate that makes the optimal trade-off between simplicity, strength and fit.

Lewis does not offer a special analysis of simplicity, so it is natural to assume that he means the conventional (if somewhat vague) notion of simplicity referred to in ordinary speech. The strength of a theory, meanwhile, might be understood as measured by deductive consequences. Hence, if the deductive consequences of theory T_1 form a proper subset of the deductive consequences of theory T_2 , we say that T_2 is stronger than T_1 .¹ However, Woodward (2014) suggests that a more relevant notion of strength is measured by deductive consequences *with respect to non-nomological facts about the world*.² Finally, the fit of a theory is measured by how well the theory lines up with worldly probability distributions.

Lewis (1994, 479) claims that it is objective which theory is best, ‘if nature is kind’. The thought is that the best theory will outstrip its rivals sufficiently such that it is obviously best, and that ‘our standards of simplicity and strength and balance are only partly a matter of psychology’ (1994, 479). This will be important when discussing descriptive simplicity in §10.4.

Consequently, lawhood is supposed to be objective and absolute. This might raise a problem for the BSA, because the simplicity of a theory seems relative to the language that it is presented in. For example, suppose that the predicate F is such that, for all x , $(Fx \leftrightarrow (Gx \wedge Hx))$. A language with predicate F in its

¹Here, I assume that the best theory is recursively enumerable. This is on the basis that the optimal balance of simplicity and strength will favour a recursively enumerable theory. There is some limited exegetical support for this contention: Lewis notes that he takes the best system to be ‘as simple in axiomatisation as it can be without sacrificing too much information content’ (1983, 367).

This is important for our current notion of strength. If the best theory was not recursively enumerable, then we would have to work with some semantically characterised consequence relation to measure strength by deductive consequence. This raises the question of which consequence relation we would appeal to, and whether hyperintensional notions – such as naturalness – would be implicit in our characterisation of that relation.

This would not be a problem for Lewis, because he is content to characterise the best theory (partly) in terms of naturalness. However, there would be a problem for Deflationary-Friendly Naturalness, which hopes to characterise naturalness in terms of the best theory at the actual world.

That said, I contend it is plausible that the best theory is recursively enumerable, thus avoiding this issue. My thanks to Jon Litland and Michael Potter for demonstrating the need for this clarification.

²Woodward (2014) also considers measuring the strength of a theory by its deductive consequences with respect to non-nomological facts, *when applied to a sentence detailing the world’s initial conditions*. This avoids those initial conditions being in our best theory.

vocabulary can simply state that an object a is F . In another language, where predicate F is not in the vocabulary, we must instead characterise this fact by saying that $Ga \wedge Ha$. This is, on the face of it, a less simple characterisation. Hence the same claim has differing levels of simplicity relative to the language it is presented in. This calls for fixing the language in which we compare our candidates for best theory.

Another potential problem is as follows. We can imagine a predicate E of masked complexity, such that Ea says that a is such that all non-nomological facts obtain. The theory described by ' $\forall xEx$ ' is thus maximally strong, and, on the face of it, maximally simple. It follows from the BSA that $\forall xEx$ is a law. This is problematic, because $\forall xEx$ includes claims about accidental regularities that are intuitively not lawful. This calls for precluding predicates like E from the language of evaluation.

BSA theorists, therefore, must fix the language of evaluation for best theory, but choose that language carefully. This is the problem to which naturalness is applied. Lewis (1983) proposes that the language of evaluation should be a perfectly natural language, whose predicates all correspond to perfectly natural properties. The theory previously presented as ' $\forall xEx$ ', when presented in a perfectly natural language, is exposed as horrendously complex. Hence, it will not be the best theory, as desired.

This, then, is the BSA and the role for naturalness in Law of Nature.

10.3 Law of Nature and Deflationary-Friendly Naturalness

It might be thought that Law of Nature poses a direct difficulty for Deflationary-Friendly Naturalness. According to my interpretation of naturalness, the language of ideal science determines which properties are perfectly natural. However, in Law of Nature, which properties are perfectly natural helps determine which theory is ideal science. Law of Nature therefore presupposes a grasp on the perfectly natural properties before we know which theory is ideal science. Deflationary-Friendly Naturalness has things in the opposite direction, presupposing knowledge of which theory is ideal science before we have a grasp on the perfectly natural properties.

Though I propose there *is* tension between Deflationary-Friendly Natural-

ness and Law of Nature, the conflict is not as direct as the last paragraph suggests. The reasoning above equivocates between ‘ideal science’ and ‘best theory’, and the two concepts are distinct. In ch.6, I described ‘ideal science’ as a complete science that is hypothetically adopted by scientists. Though these scientists *may* choose their ideal science on the basis of theoretical virtues such as simplicity and strength, this is not built into the *definition* of what ideal science is. By contrast, the BSA describes the ‘best theory’ as the most theoretically virtuous out of all true theories.

Consequently, Law of Nature presupposes a grasp of the perfectly natural properties for determining the *best* theory, whilst Deflationary-Friendly Naturalness presupposes knowledge of *ideal* science for a grasp of the perfectly natural properties. This is not yet a direct conflict between Law of Nature and Deflationary-Friendly Naturalness. However, there is intuitively some tension at play. Insofar as the selection of ideal science involves some balance of theoretical virtues, then selection of ideal science runs into the same issues of language relativity highlighted by Lewis in the BSA. If scientists appeal to a perfectly natural language of evaluation in response to solve the issue of language-relativity, then a grasp of the perfectly natural properties is presupposed and Deflationary-Friendly Naturalness becomes suspect: it takes our grasp of the perfectly natural properties to fall out of a theory that presupposes a grasp of the perfectly natural properties.

To avoid this conflict, scientists must reject the appeal to naturalness as a solution to the problem of language relativity in theory choice – instead, perhaps, simply conducting their evaluations in the standard scientific English of their time (when we are considering *English-speaking* scientists). However, if they are minded to do this, then this undermines Law of Nature as a theoretical role for naturalness. There is tension in rejecting naturalness’s role in solving language-relativity in evaluation of our *ideal* theory, but wholeheartedly accepting naturalness’s role in solving language-relativity in evaluation of our *best* theory: especially as naturalness would solve the problem in an identical manner for each.

This suggests that Deflationary-Friendly Naturalness and Law of Nature sit uneasily together. Though more might be said, the worry is that my deflationary-friendly interpretation risks sacrificing Law of Nature. On the other hand, if the BSA is an unsatisfactory account of laws of nature (on

any interpretation of naturalness), then the problem for Deflationary-Friendly Naturalness disappears. If Law of Nature does not represent a successful, theoretical role for *any* interpretation of naturalness, then there is no theoretical benefit for Deflationary-Friendly Naturalness to be incompatible with. My goal is comparative – as long as there are no theoretical benefits for other interpretations not shared by my deflationary-friendly interpretation, and my deflationary-friendly interpretation incurs fewer theoretical costs, then a plausible cost-benefit analysis favours my interpretation.

With this in mind, I turn to the argument that Law of Nature is unsuccessful on any interpretation of naturalness.

10.4 Woodward and Simplicity

Woodward's (2014) paper raises two general issues. One is whether the BSA accurately describes the actual practice of scientists; the second is whether appeals to simplicity, in the context of the BSA, admit of standard, scientific justifications.

To the first point, Woodward proposes that scientists require their theories to meet a minimal strength. For example, Woodward, discussing astronomy, notes that 'there is some pre-specified domain of results (or phenomena) that competing theories are expected to account for – this would include facts about planetary trajectories' (Woodward 2014, 100-1). Regardless of how optimally the loss of strength is balanced with increased simplicity, a theory must meet a minimal level of strength.

This reflection is not fatal to the BSA, but does suggest that the BSA could be fleshed out to discuss the balance of simplicity and strength in more detail. The practice of theory choice in actual science is not straightforward. The relationship between theoretical virtue and strength is non-linear: a minimal level of strength is incredibly important, but a little extra strength for an already strong theory is less important. Similar remarks apply to simplicity: when a theory is already relatively simple, a little more simplicity at the expense of strength is sub-optimal. Providing these details would boost the BSA's scientific credentials, and I propose that they should be adopted by the Lewisian.

My focus, however, is whether appeals to simplicity in the BSA are justified.

Woodward notes that we can justify scientific appeals to simplicity, and that these justifications are inapplicable in the context of the BSA.

For example, scientists sometimes appeal to simplicity to guide curve-fitting. Suppose that a scientist has a set of data points and is considering whether to graph them by a linear or quadratic equation. Typically, the scientist will choose the lowest degree polynomial that fits the data well – or the ‘simplest’ equation.

This practice admits of Bayesian justification. Suppose that the researcher has reason to believe that,

‘considering families of polynomials of every degree, the domain under investigation is such that each family is equally likely to contain the true curve and that within each family the probability density for which particular curve is correct is spread in a fairly uniform way over each member of the family.’ (Woodward 2014, 111)

It follows that individual curves of higher degree are less probable than those of lower degree, because they share more competitors for their ‘share’ of the probability mass.

From this example we draw two, important conclusions. Firstly, this notion of simplicity appealed to by scientists is not the simplicity of ordinary parlance. It has a precise meaning – an equation is simpler iff it is a polynomial of lower degree. Secondly, this notion is such that we can directly justify appeals to it.

Woodward considers another example. The Akaike information criterion (*AIC*) framework assesses curves by ‘some measure that reflects both fit to the data so far received and that discounts for the number of free parameters in the fitted curve’ (Woodward 2014, 114). We might, considering the BSA, identify strength with fit to the data, and simplicity with the number of free parameters. This provides a different (but, again, precise) notion of simplicity. We can justify appeals to this simplicity on the basis that the AIC framework avoids our curves ‘overfitting’ the data. By finding the optimal balance between simplicity and strength, we increase the predictive reliability of our equations regarding future data.

It is not necessarily important whether these justifications are successful. The important point is that these justifications are inapplicable in the context established by the BSA. Remember from §10.2 that, when picking our best

theory, we have available all non-nomological data. Hence, there is no further data to be predicted. Consequently, concerns about reliably predicting future data are irrelevant, and there is no need to appeal to the AIC framework to avoid overfitting. Furthermore, because we possess all non-nomological data, all the candidate theories are known to be true. It follows that the Bayesian justification of lower polynomials is similarly inapplicable. As all the theories are true, they have a probability of 1. Measures of simplicity that increase the probability of our theories therefore seem redundant – at the very least, appeals to such notions cannot be *justified* on this basis.

Finally, Woodward considers another notion of simplicity: descriptive simplicity. This can be identified with the folk notion of simplicity found in ordinary parlance. We might think that scientists favour descriptively simpler theories because they are easier to understand and work with. Increased complexity gives rise to pragmatic costs that might not be sufficiently outweighed by increased predictive accuracy.

Such pragmatic justifications of appeals to simplicity are inappropriate in the context of the BSA. As noted in §10.2, lawhood is supposed to be objective and absolute. If we justify appeals to simplicity on pragmatic grounds, then we infect lawhood with interest-relativity. This is because different pragmatic considerations demand different levels of simplicity. Suppose that an engineer and a physicist are giving theories regarding a particular bridge. We can imagine that the engineer rounds to fewer decimal places – for the sake of simplicity in calculations – whereas the physicist does not. The engineer’s theory is simpler, but not as strong as the physicist’s theory. However, this is pragmatically justified by the varying interests of the engineer and the physicist. The engineer may just want to generally account for why the bridge stands, whilst the physicist might want to go into further detail regarding the underlying physics. Following this pragmatic justification, the optimal balance of simplicity to strength shifts from prioritising simplicity for the engineer to prioritising strength for the physicist.

As the optimal balance between simplicity and strength becomes interest-relative, so does our choice of best theory. Our best theory becomes relative to what we want the theory *for*, and for *whom*. Hence lawhood becomes interest-relative rather than objective: this is typically considered a bad result by those defending the BSA.

Woodward therefore highlights problems with the BSA. Scientific justifications of simplicity don't seem applicable in the context of the BSA, and it is questionable how well the BSA, as it stands, describes actual, scientific theory-choice. In the next section, I extend these results further.

10.5 Extending Woodward's Argument

In §10.6, I consider an objection to Woodward's argument. In the meantime, we can extend Woodward's argument to apply more generally to scientific notions of simplicity, and to the BSA's appeal to strength.

Any pragmatic justification of an appeal to simplicity is inappropriate in the context of the BSA. Such a justification renders the optimal balance between simplicity and strength interest-relative. Hence, by the BSA, whether a regularity is a law becomes interest-relative.

We can make similar remarks about any appeal to simplicity that is justified in terms of tracking truth. Putting aside the details of the Bayesian justification, or the AIC framework, Woodward's point holds quite generally.

Suppose that we have a specific notion of simplicity, S , and we justify appealing to S on the basis that theories of greater S are more likely to be true (perhaps when in an appropriate balance to strength – the justification can be as complex as is wished). Regardless of the specifics of this justification, it is inapplicable in the context of the BSA. The context that the BSA establishes is one in which we have all non-nomological data. Our candidate theories for best theory are all true, and hence we don't need to appeal to S to increase any probabilities. Similarly, any justification of S concerning predictive accuracy is inapplicable, because, in the context of the BSA, there is no further, non-nomological data to be predicted. Consequently, Woodward's arguments apply to *any* notion of simplicity that is meant to help in truth-tracking or predictive accuracy.

Analogous arguments can be made about strength. The first step is to ask why scientists favour strong theories. A natural answer is that strong theories say more about phenomena that we care about. This justifies seeking strong theories, because weak theories are not useful. However, this justification is pragmatic and thus interest-relative. We have already seen that pragmatic justifications are inapplicable in the context of the BSA. If we justify appeals

to strength relative to our interests, then different researchers will evaluate theories as variably strong, depending on their interests. This affects which theory optimally balances simplicity and strength, and thus renders the best theory interest-relative. It follows that lawhood is interest-relative: a bad result.

We might consider how else appeals to strength might be justified in theory choice. Arguably, Popper's (1959) notion of falsifiability can be roughly identified as a notion of strength. The reasoning is as follows. The more numerous the deductive consequences that a theory has, the more falsifiable the theory becomes. The theory is more falsifiable because there are more theorems and consequences of the theory that might be found false.

Meanwhile, we appeal to falsifiability (and thus a notion of strength) in theory choice on the basis that it helps science progress. The trouble is that this is a truth-tracking justification. The progression of science is presumably measured by the verisimilitude of its theories.³ Hence, this justification of the appeal to strength is inapplicable in the context of the BSA. As we already have all non-nomological data, none of our candidate theories will be falsified by further data. Any appeal to strength justified in terms of falsifiability will fail to apply in this context.

Typically, stronger theories are less likely to be true. This is what justifies linking strength with falsifiability. However, we also see that appeals to falsifiability are concerned with truth – Popper argues that the best route towards truth is to aggressively falsify wherever we can. Such indirect justifications are inapplicable in the context of the BSA, as we already know that the competing candidates for best theory are true. Moreover, we cannot appeal to strength on pragmatic grounds without rendering the notion of lawhood interest-relative. Woodward's arguments against simplicity in the BSA apply analogously to the BSA's appeals to strength.

This extends Woodward's arguments, but does not offer a knockdown argument against appeals to simplicity or strength in the context of the BSA. It may be that there is some justification of simplicity or strength in the context of ordinary science that is equally applicable in the context of the BSA that I have not considered. However, I have considered two of the most plausible and

³We might consider alternative measures, such as increasing *utility*, but this results in a pragmatic justification of strength. We already know such justifications are inappropriate in the context of the BSA.

commonplace kinds of justification for simplicity and strength: that they track truth (and avoid predictive accuracy), and that they have pragmatic utility. It is hard to see what form other justifications of simplicity or strength in the context of ordinary science might take. I therefore provide a challenge to the BSA – to find such a scientific justification that is applicable in the context of the BSA. Now I defend this challenge against objections.

10.6 An Objection to Woodward's Argument

I propose that Woodward's extended argument is persuasive in showing that scientific justifications of appeals to simplicity and strength are inapplicable in the context of the BSA. From this, we might conclude as follows. Firstly, we might argue that appeals to these theoretical virtues in the context of the BSA are unjustified. Alternatively, we could argue that the BSA's notions of simplicity and strength are unscientific, and that the BSA's claim to track actual scientific practice is unwarranted.

Our detractor objects to these conclusions as follows. First, she insists that the BSA's notions of simplicity and strength *are* to be identified with scientific notions found in actual, scientific practice. Second, she notes that whilst appeals to these notions are not justified in the context of the BSA, they *are* justified in other contexts. The thought is that it is generally justifiable to appeal to simplicity and strength. Hence, when we appeal to them in the context of the BSA, those appeals are vicariously justified.

In response, I note that the appeals to simplicity and strength across different contexts are *distinct*. Crucially, I am not talking about justifying simplicity (or strength) *itself*. It is not clear what it would mean to 'justify' a concept in this way. Instead, we are justifying an *appeal* to that notion: justifying a way that we put the concept to use. Once this is seen, we find that the objection is problematic as it stands.

An appeal to simplicity in the context of ordinary science is distinct from an appeal to simplicity in the context of the BSA – not only are the contexts different, but simplicity is being put to different uses in each case. In the context of ordinary science, scientists appeal to simplicity to guide them in theory choice: to evaluate competing theories, *not all of which are true*, to seek the true theory. In the context of the BSA, we appeal to simplicity not to

guide us in choosing the true theory, but in choosing the *best* theory. I propose that these are distinct projects.

It follows that justifying the first kind of appeal to simplicity does nothing to justify the second. There is no vicarious justification because we are talking about entirely different kinds of appeal to simplicity or strength. Theory choice in ordinary science is not best theory choice. Consequently, we should resist this objection to Woodward's extended arguments.

10.7 Consequences and Conclusions

I have outlined Woodward's arguments against the BSA, extended them to apply more generally, as well as to strength. I have considered an objection against Woodward's arguments, and sought to show that it is flawed. It follows that the justifications of appeals to simplicity and strength made in the context of ordinary science are inapplicable when applied in the context of the BSA. This is because the BSA establishes a context where we have available all non-nomological facts, and all the candidate theories are already known to be true. Hence, justifications based on tracking truth, or making better predictions about further data, are inapplicable in the context.

I propose that the arguments show that the BSA's notion of lawhood is unscientific, and thus a problematic analysis of scientific lawhood. Consequently, I conclude that the BSA faces important issues.

Insofar as the BSA faces important issues, Law of Nature as a theoretical role for naturalness is in doubt. If naturalness cannot play this theoretical role, then Deflationary-Friendly Naturalness's tension with Law of Nature puts no theoretical benefit at risk. This preserves the favourability of Deflationary-Friendly Naturalness in a plausible cost-benefit analysis between interpretations of naturalness.

This completes my defence of Deflationary-Friendly Naturalness. I have argued that it enjoys all of the theoretical benefits enjoyed by rival interpretations. However, I maintain that it enjoys these benefits more cheaply, because it does not commit us to claims about the objective structure of reality. A plausible cost-benefit analysis therefore favours Deflationary-Friendly Naturalness as the correct interpretation. This defangs naturalness-variants of hyperintensional manoeuvre, defending deflationary heuristics.

Chapter 11

Relative Naturalness

11.1 Introduction

This chapter considers Lewis’s analysis of relative naturalness in more detail. As we shall see, there are complexities, but this chapter defends something like Lewis’s analysis. In Part 3, the practice of measuring relative naturalness by the definitional complexity of perfectly natural definitions is commonplace. It is therefore important to defend that practice here.¹

As noted in ch.6, Lewis (1983) defines relative naturalness as a function of the complexity of perfectly natural definition. A perfectly natural definition is a definition of a property in perfectly natural terms. For example, the property of being red might be perfectly naturally defined in terms of wavelengths and frequencies of light (assuming that wavelengths and frequencies correspond to perfectly natural properties).

Suppose that α and β are properties. Suppose further that γ is a perfectly natural definition of α , and δ is a perfectly natural definition of β . Lewis suggests the following:

¹We find a similar project in Bennett (2017). Bennett accounts for relative fundamentality in terms of ‘building relations’, such as composition. However, there are reasons to think that we cannot straightforwardly apply an analogous account to relative naturalness. Bennett relies on the availability of asymmetric building relations to provide for the direction of relative fundamentality. Yet, when considering the relative fundamentality of properties, the most obvious building relation to appeal to is relative naturalness. Intuitively, attempts to define building relations such as ‘definitional complexity’ are attempts to define relative naturalness itself. Hence, it is not clear that relative naturalness reduces to more basic building relations. This is a significant disanalogy and suggests that we cannot use something like Bennett’s account of relative fundamentality to account for relative naturalness.

Lewis's Relative Naturalness Definition: α is more natural than β iff γ is less complex than δ .

An immediate question is how to measure the relative complexity of γ and δ . A standard measure is to compare the number of connectives used in those perfectly natural definitions.

For example, suppose that α and β have the following perfectly natural definitions, when the properties *being F*, *being G* and *being H* are perfectly natural:

$$\alpha x \text{ iff } (Fx \wedge Gx).$$

$$\beta x \text{ iff } (Fx \wedge Gx \wedge Hx).$$

This defines properties in terms of their respective predicates. This permits the use of logical connectives, so that we can count the number of connectives used in perfectly natural definitions.²

An immediate problem with this suggestion is that a property may have various perfectly natural definitions of varying complexity.

As before, suppose that α has the following perfectly natural definition:

$$\alpha x \text{ iff } (Fx \wedge Gx).$$

Instead of stating this with conjunction, we might have stated this with disjunction:

$$\alpha x \text{ iff } \neg(\neg Fx \vee \neg Gx).$$

The first perfectly natural definition of α has one ' \wedge ' and thus one logical connective. The second perfectly natural definition of α contains three ' \neg ' and one ' \vee ', and thus four logical connectives. One is fewer than four, so the first perfectly natural definition is less complex than the second. Hence, by Lewis's

²The alternative would make the use of logical connectives ungrammatical. For example, suppose that we defined α as follows:

α is the property of being *F* and being *G*.

In such a definition, the 'and' cannot be logical conjunction, as connectives must connect *sentences*. It is therefore more straightforward to define properties in terms of their predicates.

Relative Natural Definition, α is more natural than itself. This is an absurd result.

The solution is quite straightforward. We insist that when comparing the relative naturalness of two properties, we compare the complexity of their *simplest* perfectly natural definitions – that is, their perfectly natural definitions with the fewest logical connectives.

To avoid gerrymandered logical connectives that make all definitions minimally simple, we insist on a canonical logical language for perfectly natural definitions. For example, our canonical logical language might admit the standard logical connectives:

$$\wedge, \vee, \rightarrow, \leftrightarrow, \neg.$$

This, then, is a standard interpretation of Lewis’s relative naturalness. I now turn to considering some problems with the definition, and responses that Lewis might make.

In §11.2, I consider the epistemological availability of perfectly natural definitions. I argue that these epistemological problems are to be expected, and can be downplayed due to the availability of epistemological heuristics. In §11.3, I consider Williams’s (2007) argument that perfectly natural definitions fail to capture genuine vagueness in the world. I argue that perfectly natural definitions can capture genuine vagueness in the world, as long as the Lewisian distances themselves from Lewis’s preoccupation with microphysicalism. In §11.4, I explore difficulties regarding infinitely complex, perfectly natural definitions. I suggest that this problem merits considering other measures of definitional complexity. These alternative measures raise the question of how partial an ordering on properties relative naturalness constitutes. In §11.5, I explore this point further and consider alternative measures of definitional complexity. In §11.6, I explore cases where two properties have equally complex, perfectly natural definitions, but do not appear to be equally natural. I discuss Guigon’s (2014) suggestion that relative naturalness should be a measure of both definitional complexity, and the degree of similarity between definitional components. In §11.7, I consider taking relative naturalness as primitive, but argues that this leaves relative naturalness with no structure or epistemology. In §11.8, I conclude.

The problems considered in this chapter do not constitute special problems for Deflationary-Friendly Naturalness. This is because any naturalness theorist must give an account of relative naturalness. This chapter is therefore concessionary to the substantivist – defending the meaningfulness of relative naturalness. However, as noted above, I make use of Lewis’s analysis of relative naturalness throughout Part 3. Though this chapter is not necessary to defend Deflationary-Friendly Naturalness, it does serve a role in my defence against grounding-variants of hyperintensional manoeuvre.

11.2 Epistemological Availability

Williams (2011, 8) notes that the project of reducing all properties to their perfectly natural definitions is ‘grandly ambitious’. A concern is that we have no guarantee that such perfectly natural definitions exist.

For example, consider what the perfectly natural definition of *being human* might look like. Following Lewis’s materialism, we might try to reduce the property to microphysical properties. Yet this will be fiendishly complex and it is not obvious where to start. Perhaps there is no such definition.

A Lewisian might respond that the set of perfectly natural properties describe (the properties of) the world completely without redundancy. This is to equate the perfectly natural properties with the *sparse* properties. This builds in the guarantee that all properties are definable in perfectly natural terms. If we were to find that *being human* could not be reduced to a microphysical characterisation, all this would show is that *being human* is a perfectly natural property.³

To this, Williams should respond that this problem is best viewed as *epistemological*: the problem of *knowing* a property’s perfectly natural definitions, rather than the *metaphysical* problem of whether a property *has* some perfectly natural definitions. The thought is that we don’t have enough of a grasp of such perfectly natural definitions to begin *counting* the number of logical connectives involved in their simplest presentations.

The epistemological problem has more bite. If we cannot begin to construct perfectly natural definitions of properties, then (even if those perfectly

³An alternative response is that *being human* cannot be given a perfectly natural definition because it is too vague a property. If the Lewisian were to argue that no vague properties exist, then they could deny that *being human* needs a perfectly natural definition.

natural definitions exist) we cannot begin to guess at the complexity of a property's simplest, perfectly natural definition. This raises severe epistemological problems for determining when one property is more natural than another. It follows that Lewis's Relative Naturalness Definition is of limited practical, epistemological help for determining claims of relative naturalness.

Call this the *Epistemological Availability* problem.

In response, I propose that Lewis should simply bite the bullet and accept that sometimes it is hard to know whether one property is more natural than another. Most naturalness-theorists will accept that it is sometimes difficult to determine the relative naturalness of a property. Furthermore, the cost of biting this bullet can be downplayed. This is because the difficulty of obtaining knowledge admits of degrees. Lewis's Relative Naturalness Definition can provide heuristics and clues even when we can't fully *know* the answer: it can provide us with educated guesses. We can take educated guesses at the kind of perfectly natural definitions that are available, and whether one is going to be more complex than another. For example, on the materialist assumption that the properties of fundamental physics are perfectly natural, we can guess that some properties are more quickly reducible to microphysical properties than others.

Consequently, Lewis's Relative Naturalness Definition can be defended from the Epistemological Availability problem.

11.3 Precisifying Vagueness

Lewis's Relative Naturalness Definition faces other challenges. Williams (2007) raises the worry that perfectly natural definitions do away with the genuine vagueness of properties.

The worry is as follows. Suppose that the property *being bald* is genuinely vague. However, to give a perfectly natural definition of *being bald*, on Lewis's presumption of materialism, reduces baldness to the microphysical. The problem is that microphysical properties don't seem to be genuinely vague. Hence, by giving a perfectly natural definition of *being bald*, we do away with the genuine vagueness in the property.

Call this the *Precisifying Vagueness* problem.

As a supervaluationist, Lewis (1988) has the resources to meet this objec-

tion. Lewis suggests that vague predicates have a variety of different, acceptable precisifications. Suppose that F is a vague predicate and a is an individual. If, on all acceptable precisifications, a is F , then we can say more generally that a is F . For example, if all acceptable precisifications agree that a hairless man is bald, then we can say more generally that the man is bald. If, on all acceptable precisifications, a is not F , then we can say more generally that a is not F . For example, if all acceptable precisifications agree that a man with a full set of hair is not bald, then we can say more generally that the man is not bald. Finally, if on *some but not all* acceptable precisifications, a is F , then we say more generally that it is indeterminate whether a is F . For example, if a man with thinning hair is declared bald on some acceptable precisifications, but declared not bald on others, then we can say more generally that it is indeterminate whether the man is bald. The point is that the vagueness is at the level of language rather than in the world. Baldness is vague because it is a vague predicate with numerous acceptable precisifications.

On this view, there will not be one perfectly natural definition of the property *being bald*. This is because there is more than one acceptable precisification of baldness. We can treat *being bald* as a bundle of overlapping, but distinct properties, each of which has a precisification (given by a perfectly natural definition). Alternatively, we can say that the perfectly natural definition of *being bald* will reflect the variety of different, acceptable precisifications.

Against the supervaluationist, the substantivist might argue that there is genuine, metaphysical vagueness in the joints of nature. The supervaluationist places vagueness in language rather than in the world. Some varieties of substantivist might think that this is a mistake, and that the supervaluationist response is not available in response to the Precisifying Vagueness problem.

The immediate response to make is that the phenomenon of metaphysical vagueness in the world does not imply the metaphysical vagueness of the perfectly natural properties. For example, it may be metaphysically vague whether there is some object a that is F because it is metaphysically vague whether a exists – rather than because F is a metaphysically vague property.⁴

Further, I think we should challenge the assumption that perfectly natural properties cannot be vague, if there is genuine vagueness in the world. Remember from §11.2 that the perfectly natural properties completely account

⁴My thanks to Jon Litland and Michael Potter for offering this response on my behalf.

for (the properties of) the world without redundancy. This is built into the notion of naturalness. Suppose that there is genuine vagueness in the world. It follows that there must be some perfectly natural properties that are genuinely vague.

For example, suppose that the Lewisian decides to take similarity as a primitive, and treats *is similar to* as a perfectly natural property.⁵ The Lewisian can then insist that *is similar to* is a vague property despite being perfectly natural. More generally, I do not feel the force of the intuition that perfectly natural properties cannot be vague.

Perhaps the point is that *microphysical* properties are not vague, and Lewis's (1983) preoccupation with materialism results in only microphysical properties being perfectly natural. If this is the case, then perhaps the problem is not with Lewis's Relative Naturalness Definition, but instead with his preoccupation with materialism. As aforementioned, the perfectly natural properties are sufficient to completely account for (the properties of) the world without redundancy. If there is genuine vagueness in the world, then this should be reflected in the perfectly natural properties. Alternatively, if there is not genuine vagueness in the world, then the Precisifying Vagueness problem can be met with supervaluationism.

Lewis's Relative Naturalness Definition can therefore be defended from the Precisifying Vagueness problem.

11.4 Infinite Complexity

However, there are further problems associated with Lewis's Relative Naturalness Definition. Sider (2011) notes that even the simplest, perfectly natural definitions of some properties may be infinitely long. For example, consider the property *being red*. We might (imperfectly naturally) define this property as follows:

$$x \text{ is red iff } (x \text{ is scarlet} \vee x \text{ is crimson} \vee \dots)$$

and so on for every shade of red. To reach a perfectly natural definition of *being red*, we then give perfectly natural characterisations XYZ_n of each shade

⁵Note that I treat relations as properties of degree greater than 1.

of red:⁶

$$x \text{ is red iff } (x \text{ is } XYZ_1 \vee x \text{ is } XYZ_2 \vee \dots)$$

and so on for every perfectly natural characterisation of every shade of red. This perfectly natural definition appears infinitely long.

It might be responded that perfectly natural definitions of infinite length are avoidable. For example, we might define *being red* as follows:

$$x \text{ is red iff } x \text{ possesses wave properties between } XYZ_1 \text{ and } XYZ_n,$$

if XYZ_1 and XYZ_n covered the range of all shades of red, and we could make precise having wave properties *between* them. Sider (2011) similarly suggests that some properties that seem to admit of infinitely long, perfectly natural definitions could instead be given finite, *functionalist* perfectly natural definitions.

However, it is not obvious how we can rule out *a priori* the possibility that the simplest perfectly natural definitions of some properties are infinitely long. If there is such a property, we can present the following problem.

Suppose that the simplest perfectly natural definitions of α have infinite complexity. We can imagine another property β defined as follows:

$$\beta x \text{ iff } (\alpha x \vee x \text{ is feline}).$$

Suppose that an individual being α doesn't imply that the individual is feline (i.e. that α and β are distinct). Intuitively, we might want to say that α is more natural than β . However, this result is not delivered by Lewis's Relative Naturalness Definition. This is because the simplest perfectly natural definitions of β also have infinite complexity. It follows that the simplest perfectly natural definitions of α and β are equally complex. By Lewis's Relative Naturalness Definition, it follows that α and β are equally natural. This produces a counterexample to Lewis's Relative Naturalness Definition.

Call this the *Infinite Complexity* problem.

To meet this issue, the Lewisian might consider alternative measures of simplicity than the number of definitional components. Suppose that γ is a perfectly natural definition. We can correspond γ with the set of perfectly

⁶These characterisations might be seen as perfectly natural 'property-bundles' regarding wavelengths and frequencies of light.

natural properties that are referred to in γ . Call this set a *definitional toolbox set* of γ .

For example, suppose that γ is given by the predicate ‘being a quark or being a lepton’. γ corresponds with a set of perfectly natural properties that are referred to in γ , given as $\Omega = \{\text{being a quark}, \text{being a lepton}\}$. We can then say that Ω is a definitional toolbox set of γ .

Hence, when γ is a perfectly natural definition:

Definitional Toolbox Set Definition: Ω is the definitional toolbox set of γ iff $\forall x(x \text{ is a property referred to in } \gamma \leftrightarrow x \in \Omega)$.

The idea is to compare the sizes of definitional toolbox sets as a measure of definitional complexity between properties. However, we want to appeal to definitional toolbox *multisets*.

A multiset is a collection of unordered elements, where every element x occurs a finite number of times. Glen (2017) notes that ‘the difference between sets and multisets is in how they address multiples: a set includes any [element] at most once, while a multiset allows for multiple instances of the same [element]’.

I use ‘ $\langle \rangle$ ’ and ‘ \rangle ’ brackets to designate a multiset, such that $\langle \text{Socrates, Socrates, Aristotle} \rangle$ is a multiset. Meanwhile, I use the standard ‘ $\{$ ’ and ‘ $\}$ ’ brackets to designate a set, such that $\{\text{Socrates, Aristotle}\}$ is a set. The distinction between sets and multisets can be demonstrated in the following example:

$$\langle \text{Socrates, Socrates, Aristotle} \rangle \neq \langle \text{Socrates, Aristotle, Aristotle} \rangle$$

$$\{\text{Socrates, Socrates, Aristotle}\} = \{\text{Socrates, Aristotle}\} = \{\text{Socrates, Aristotle, Aristotle}\}$$

I appeal to definitional toolbox multisets because the repetition of a property can make a perfectly natural definition more complex.

For example, consider the two perfectly natural definitions below:

$$\gamma = \langle (Fx \vee Gx \vee Hx) \rangle$$

$$\delta = \langle ((Fx \wedge Gx) \vee (\neg Fx \wedge Hx)) \rangle$$

γ is less complex than δ . This is because γ employs three properties instead of four. However, they have the same definitional toolbox sets, suggesting that the relative size of definitional toolbox sets does not adequately measure complexity. The solution is to appeal to multisets. γ and δ have different definitional toolbox multisets, and the size of those multisets can be compared.

Hence, when γ is a perfectly natural definition:

Definitional Toolbox Multiset Definition: Ω is the definitional toolbox multiset of γ iff $\forall x(x \text{ is a property referred to in } \gamma \leftrightarrow x \text{ is in } \Omega \text{ as many times as it is referred to in } \gamma)$.

Suppose that γ and δ are perfectly natural definitions (of properties α and β , respectively). Suppose further that Ω is the definitional toolbox multiset of γ , and that Π is the definitional toolbox multiset of δ . To reach our measure of definitional complexity, we say that

Definitional Complexity by Definitional Toolbox Multiset: γ is less complex than δ iff $\Omega \subset \Pi$.

This involves a concept of proper sub-multisets. Once we have grasped the notion of a multiset, however, the notion of a proper sub-multiset is straightforward:

Ω is a proper sub-multiset of Π iff

1. Ω and Π are multisets;
2. For all members x of Ω : if x is in Ω n times, then x is in Π n times (when n is a number); and
3. $\Omega \neq \Pi$.

Lewis's Relative Naturalness Definition then applies as before:

Lewis's Relative Naturalness Definition: α is more natural than β iff γ is less complex than δ ,

when complexity is measured as indicated by Definitional Complexity by Definitional Toolbox Multiset.

This alternative measure of complexity avoids the Infinite Complexity problem. This is because we can compare the sizes of definitional toolbox multisets

even if the multisets contain infinitely many members. It can be the case that $\Omega \subset \Pi$ even if Ω and Π are both of infinite size.

11.5 Partial Ordering

On the other hand, this alternative measure of complexity raises issues regarding the ordering on properties that relative naturalness constitutes. Specifically, it affects how partial that ordering is taken to be.

It is sometimes intuitive to think that relative naturalness constitutes only a *partial* ordering on properties. To motivate this intuition, compare the properties *being the logical connective tonk*⁷ and *being grue*.⁸ Both concepts are deliberately gerrymandered. However, it is not clear that either property is more natural than the other, or that they are equally natural. I propose that it is intuitive that they are simply *not comparable* regarding their naturalness.

Consequently, we might think that some properties cannot be compared for their relative naturalness. On the other hand, measuring complexity by the comparative size of definitional toolbox multisets results in a *very* partial ordering on properties. To see this, note that we can compare the complexity of γ and δ only if

$$(\Omega \subset \Pi) \vee (\Omega = \Pi) \vee (\Pi \subset \Omega),$$

when Ω is the definitional toolbox multiset of γ , and Π is the definitional toolbox multiset of δ . That is, only if Ω and Π are the same multiset, or one is

⁷Tonk is introduced by Prior (1967) as a problem for defining logical connectives by inferential rules. Tonk's introduction rule is analogous to \vee -introduction, and given as follows:

$$\frac{p}{p \text{ tonk } q}$$

whilst its elimination rule is analogous to \wedge -elimination, and given as follows:

$$\frac{p \text{ tonk } q}{q}$$

The problem is that tonk licenses the derivation of q from p , regardless of their interpretations.

⁸See Goodman (1955) for his discussion of grue and the 'new riddle of induction'. 'Grue' admits of several standard definitions. One is that an individual a is grue iff a is examined and green, or a is unexamined and blue. Another is that an individual a is grue iff it is before t , and a is green, or else it is after t and a is blue (for some future time t).

a sub-multiset of the other. This is not the case when Ω and Π both contain perfectly natural properties that are not in the other.

This may be considered problematic. Consider two properties. The first is given by the predicate ‘(x is oxygen \vee x is my left foot)’. Call this property ‘ α ’. The second is given by predicate ‘ βx iff (x is oxygen \vee x is carbon)’. Call this property ‘ β ’. We might think it intuitive that α is less natural than β . However, by the present measure, it follows that α and β are not comparable for relative naturalness. An (imperfectly natural) definitional toolbox multiset corresponding to α is $\Omega = \{\text{being oxygen, being my left foot}\}$, and an (imperfectly natural) definitional toolbox multiset corresponding to β is $\Pi = \{\text{being oxygen, being carbon}\}$. Unfortunately:

$$\neg((\Omega \subset \Pi) \vee (\Omega = \Pi) \vee (\Pi \subset \Omega)).$$

It is plausible that perfectly natural, definitional toolbox multisets corresponding to α and β inherit this problem. This means that it is not the case that α is less natural than β . This is a problematic result.

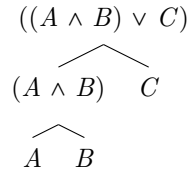
It is plausible that there are many properties that are intuitively comparable regarding naturalness, but do not correspond to comparable definitional toolbox multisets. Consider the property *being green* and the property defined by ‘ x is the Eiffel Tower \vee x is my nose’. Intuitively, we want to say that the first property is more natural than the second. However, it is not obvious that we can compare the size of their corresponding definitional toolbox multisets.

We might think to appeal to the *number* of members in their corresponding definitional toolbox multisets: the first property has one and the second property has two. However, this allows the Infinitely Complex problem to reassert itself. If we measure complexity by counting the members of definitional toolbox multisets, then we have problems when there are infinitely many members in definitional toolbox multisets. It would mean that all perfectly natural definitions with infinitely large, definitional toolbox multisets are equally complex.

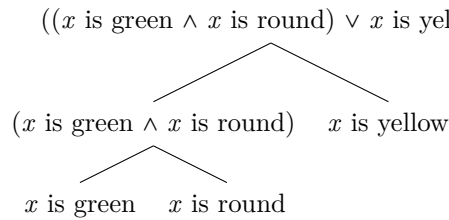
This is why we wanted to measure complexity by the relative *size* of definitional toolbox multisets. On the other hand, we have seen that this makes the ordering on properties implausibly partial. Call this the *Partial Ordering* problem.

The Partial Ordering problem suggests that we should continue looking for an alternative measure of complexity. One is given by the idea of a sentential

construction tree. It is a familiar idea that we can break down a sentence sequentially by identifying its main logical operator. For example, we might break down ‘ $((A \wedge B) \vee C)$ ’ as follows:

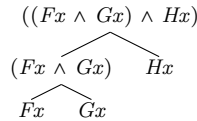


We might use the notion of a *property* construction tree along analogous lines. For example, we might break down the property defined by ‘ $((x$ is green and x is round) or x is yellow)’ as follows:

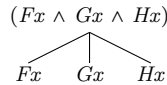


Suppose that we were interested only in the *structure* of a property construction tree. Whenever we come across a property, we assign it an uninterpreted predicate. Hence, with the property construction tree above, we arrive at the following *structural property construction tree*:⁹

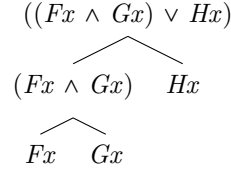
⁹It should be noted that there are certain rules to structural property construction trees. Importantly, we treat connectives as having arbitrary length. For example, the following is ‘ungrammatical’:



Instead, we should have:



I make this stipulation to avoid ‘ $(Fx \wedge (Gx \wedge Hx))$ ’ and ‘ $((Fx \wedge Gx) \wedge Hx)$ ’ having distinct structural property construction trees.

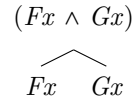


Because we have stripped away the interpretation and focused on the *structure*, the above is a structural property construction tree of various properties. For example, it is a structural property construction tree of both the property defined by ‘((x is green \wedge x is round) \vee x is yellow)’ and the property defined by ‘((x is mammal \wedge x is tall) \vee x is lizard)’.

We can provide structural property construction trees of perfectly natural definitions. Suppose that γ and δ are perfectly natural definitions. The following is an alternative measure of their relative definitional complexity:

Definitional Complexity by Structural Property Construction Tree: γ is less complex than δ iff the structural property construction tree of γ is a sub-tree of the structural property construction tree of δ .

A sub-tree is intuitively a *part* of a structural property construction tree. Suppose that δ ’s structural property construction tree is as above. Suppose then that γ ’s structural property construction tree is as below:



γ ’s structural property construction tree is a part of δ ’s structural property construction tree. We say that the former is a *sub-tree* of the latter.

Lewis’s Relative Naturalness Definition then applies as before:

Lewis’s Relative Naturalness Definition: α is more natural than β iff γ is less complex than δ ,

when complexity is measured as indicated by Definitional Complexity by Structural Property Construction Tree.

By focusing on structure, we avoid relative naturalness constituting a very partial ordering on properties. Furthermore, it allows for flexibility in which

properties are comparable. For example, suppose that a property α corresponds to the following structural property construction tree:

$$\begin{array}{c} (Fx \wedge Gx) \\ \wedge \\ Fx \quad Gx \end{array}$$

Further, suppose that a property β corresponds to the following structural property construction tree:

$$\begin{array}{c} (Fx \vee Gx) \\ \vee \\ Fx \quad Gx \end{array}$$

There are two ways of reading these structural property construction trees. On the first reading, they are seen as identical structural property construction trees. This is on the basis that the details of each node – that is, the connective employed – are unimportant to the structure of the tree. On this reading, α and β are equally natural. On the second reading, the two trees are seen as distinct. This is on the basis that the nodes use distinct connectives. On this reading, α and β are not comparable.

We can continue this theme of flexibility. We can imagine a naturalness theorist who thinks that disjunctive properties are less natural than conjunctive properties. To accommodate this intuition, such theorists should supplement Definitional Complexity by Structural Property Construction Tree with rules about what to do when two identical trees involve different connectives. First, they would adopt the first reading of the trees, such that the details of each node are unimportant to the structure of the trees. This will allow them to find that the two trees are equally complex, on the standard measure given by Definitional Complexity by Structural Property Construction Tree. Next, they should apply their supplemental rules to this standard measure of complexity. One such rule might be as follows:

Conjunction and Disjunction: If the structural property construction tree of γ is identical to the structural property construction tree of δ , but the former (unsubstituted) tree mentions ‘ \wedge ’ and the latter (unsubstituted) tree mentions ‘ \vee ’, then γ is less complex than δ .

The situation might become more complicated if the two trees contain both

conjunction and disjunction. However, perhaps the right response at this point is that neither perfectly natural definition is more complex than the other. Alternatively, the naturalness theorist might appeal to multisets of disjunctions contained in each tree. Perhaps the perfectly natural definition whose tree has the smaller multiset of disjunctions is less complex than the other.

The current measure of definitional complexity is flexible. It is well-positioned to accommodate various intuitions that the naturalness theorist might have. The only cost involved is an increasing complexity of that measure. This provides the Lewisian a defence from the Partial Ordering problem.

It should be noted that two logically equivalent, perfectly natural definitions can have distinct structural property construction trees. For example, the perfectly natural definition given by $(Fx \wedge (Gx \vee Hx))$ is logically equivalent to the perfectly natural definition given by $((Fx \wedge Gx) \vee (Fx \wedge Hx))$, but the two perfectly natural definitions have distinct structural property construction trees. This does not mean that there are symmetric instances of the relation *more natural than*. This is because the relative naturalness of a property is a measure of the definitional complexity of that property's *simplest* perfectly natural definition.

To determine which perfectly natural definition of a property is simplest, we apply the measure given by Definitional Complexity by Structural Property Construction Tree. If a property has multiple, simplest perfectly natural definitions, we say that a property α is more natural than a property β iff *some* simplest, perfectly natural definition is less complex than *all* simplest, perfectly natural definitions of β .^{10,11}

This current measure faces some limitations, however. Most notably, it is not clear how to build a property construction tree involving quantification.

¹⁰Depending on how partial an ordering we want relative naturalness to impose, it may happen that two perfectly natural definitions of a property are of incomparable complexity. This is problematic, and provides motivation for treating nodal differences in trees as structurally unimportant. Alternatively, the naturalness theorist can stipulate further rules for determining what happens when a property has multiple perfectly natural definitions of incomparable complexity.

¹¹Alternatively, some substantivists might argue that

if two properties have distinct perfectly natural definitions (that are incomparable with respect to relative naturalness), then those properties are distinct

– even when those perfectly natural definitions are logically equivalent.

I add the bracketed caveat to avoid the issue of trivial differences between perfectly natural definitions. For example, we might balk at $Fx \wedge Gx$ and $(Fx \wedge Gx) \wedge \neg(p \wedge \neg p)$ defining different properties. By insisting that the definitions must be incomparable with respect to relative naturalness, we rule out these kinds of cases.

This is because quantified sentences cannot be straightforwardly broken down into atomic sentences.

As it is, this limitation is unproblematic in the context of this thesis. The perfectly natural definitions that I appeal to throughout Part 3 do not involve quantification.¹² Hence, the current measure of definitional simplicity is sufficient for comparing the relative naturalness of the perfectly natural definitions that I want to use. With this in mind, I am happy to bracket these limitations in this thesis.

On the other hand, the substantivist who wants to define relative naturalness in terms of perfect naturalness may need to offer a revision of our current measure of definitional simplicity. As noted, I am content to leave the ball in the substantivist's court on this issue.

11.6 Variably Natural, Fixedly Complex

I now consider a final problem for Lewis's Relative Naturalness Definition.

Nolan (2005) asks us to consider the property α given by the predicate ' $(x$ is carmine $\vee x$ is vermillion)', and the property β given by the predicate ' $(x$ is carmine $\vee x$ is azure)'. Though the properties *being carmine*, *being vermillion* and *being azure* are not perfectly natural, it is plausible that they are all equally natural. This means that the simplest perfectly natural definitions of each property are equally complex. It follows that the simplest perfectly natural definitions of α and β are equally complex. By Lewis's Relative Naturalness Definition, α and β are equally natural.

Nolan suggests that this result is implausible. This is because β is more 'improperly disjunctive' than α . This is because α is a disjunction of shades of red, whilst β is a disjunction of shades of red *and* blue. On this basis, they argue that α is more natural than β , and that this produces a counterexample to Lewis's Relative Naturalness Definition.

Call this the *Variably Natural, Fixedly Complex* problem.

In response, Guigon (2014) presents the following solution. He advises us to take more seriously Lewis's idea that relatively natural properties are 'made so by families of suitable related universals' (Lewis 1983, 347). The thought is that relative naturalness is not merely a function of definitional complexity,

¹²See §15.3 for further discussion of this point.

but a function of definitional complexity *and the degree of similarity between those definitional components*.

To see how this solution works, consider Nolan's example. We saw that it is plausible that the simplest, perfectly natural definitions of each property are equally complex. However, the properties *being carmine*, *being vermillion* are more *similar* than the properties *being carmine*, *being azure*. This is because carmine and vermillion are shades of red, whilst azure is a shade of blue.

Guigon's suggestion therefore implies that α is more natural than β . This meets Nolan's case. This 'similarity supplement' can be added to any of the measures of definitional complexity considered in §11.4 and §11.5.

However, the similarity supplement comes with a cost for Lewisians. Lewis (1983) wants to analyse similarity in terms of naturalness:

Similarity: Two individuals a and b are similar iff they both instantiate some property, α , such that α is a relatively natural property.

This analysis becomes viciously circular if we adopt the similarity supplement for Lewis's Relative Naturalness Definition. Adopting the supplement means that relative naturalness is partly analysed in terms of similarity. This causes trouble if we then try to analyse similarity in terms of relative naturalness. Guigon's solution to the Variably Natural, Fixedly Complex problem therefore involves abandoning a theoretical role for naturalness.

Alternatively, the Lewisian could challenge Nolan's intuition that α is more natural than β . There are shades of red between carmine and vermillion, and each shade actually corresponds to a range of colours (because there are different shades of carmine, for example). α therefore singles out two, disjointed ranges of colours and connects them by disjunction. β does the same. Though the two ranges of colours singled out by α are all *red* – and this is not the case with β – it is not obvious that this makes α more natural than β .

I propose that the Lewisian's response should depend on their intuitions about α and β . It seems available for them to deny that α is more natural than β . However, if this does not square with their intuitions, then they can adopt Guigon's similarity supplement at the cost of abandoning Similarity.

11.7 Primitive Relative Naturalness?

Rather than trying to supplement or modify measures of definitional complexity, Williams (2007) considers abandoning analyses of relative naturalness in the first place. This suggestion takes relative naturalness as primitive. Similarly, Taylor (1993) expresses his surprise that Lewis treats *perfect* naturalness rather than *relative* naturalness as primitive.

This approach avoids problems associated with measuring relative naturalness by the complexity of perfectly natural definition. Taking relative naturalness as primitive divorces relative naturalness from such measures.

However, these gains come with associated costs. Lewis's Relative Naturalness Definition gives relative naturalness *structure*: it provides information about what relative naturalness amounts to. This means that, though primitive, relative naturalness avoids the problems previously discussed, it may run into *analogous* problems. For example, if relative naturalness is primitive, it is unobvious how partial the ordering it constitutes is. It might be argued that the Partial Ordering problem is more difficult, because now the answer doesn't 'fall out' of various measures of definitional complexity.

Additionally, consider the Epistemological Availability problem. The problem as stated in §11.2 raises epistemological concerns about how we can *know* the perfectly natural definitions of properties, and hence how we can know their complexity. Primitive, relative naturalness removes the need for us to know the perfectly natural definitions of properties. However, it does not replace measures of definitional complexity with some other epistemology for determining whether one property is more natural than another. Instead, it merely does away with an (perhaps flawed) epistemological methodology for answering such questions. It might be argued that *some, potentially imperfect* epistemological methodology is better than none at all. Consider the two properties defined by '*x* is a bird' and '*x* is a mammal'. How might we determine which property is more natural (if either is), if we cannot compare the relative complexity of their perfectly natural definitions?

The worry, then, is that primitive, relative naturalness throws the baby out with the bathwater. It sees flaws with the structure given by Lewis's Relative Naturalness Definition, and responds by removing all structure from relative naturalness altogether.

Moreover, we have to balance the cost of losing this structure with the benefits of avoiding problems associated with measures of definitional complexity. In previous sections, I defend Lewis's measures of definitional complexity and argue that the associated problems can be met. Hence, appealing to primitive relative naturalness does not constitute much benefit. The cost of losing structure for relative naturalness is therefore not outweighed by any substantial benefits. I therefore propose that the Lewisian is better served precisifying and improving on measures of definitional complexity.

Suppose that Lewis abandoned his measures of definitional complexity and instead adopted primitive, relative naturalness. It is worth considering how primitive, relative naturalness could be afforded a deflationary-friendly interpretation. I propose the following interpretation:

Deflationary-Friendly Primitive Relative Naturalness: α is a relatively natural property iff α is a property referred to by a predicate in the language of ideal science.

This differs from Deflationary-Friendly Naturalness by relaxing the requirement that α is a property referred to by a *primitive* predicate in the language of ideal science. It is worth noting that the language of ideal science need not be sparse: scientists will likely find it convenient to have predicates referring to properties that are not perfectly natural. For example, the language of ideal science will likely have a predicate for *being water* in addition to predicates for *being hydrogen* and *being oxygen*. Hence, the property of being water will be relatively natural on this interpretation.

When comparing properties for their naturalness, various measures might be considered. Taylor (1993) suggests that the centrality of a property to a theory can be measured by his 'T-cosiness' measure. We might therefore say that a more central property in ideal science is a more natural property. Similarly, we can consider Goodman's (1955) notion of entrenchment. A property is more entrenched relative to a theory insofar as it finds more work in the inductive generalisations of the theory. We might therefore say that a more entrenched property in ideal science is a more natural property. More work would be needed to spell out these notions in more detail, but these ideas are illustrative of the direction that the work would take.

Meanwhile, we can define perfect naturalness as a limiting case of relative naturalness.

Non-Primitive Perfect Naturalness: α is perfectly natural iff, for all properties X , it is not the case that X is more natural than α .

As Deflationary-Friendly Primitive Relative Naturalness is relative to ideal science, the interpretation it offers is properly deflationary-friendly. I propose that, with sufficient work, we can show that Deflationary-Friendly Primitive Relative Naturalness fulfils the same theoretical roles as standard interpretations of primitive, relative naturalness. Hence, a plausible cost-benefit analysis favours my interpretation as the correct interpretation of primitive, relative naturalness.

That said, I believe that we should avoid positing primitive, relative naturalness, for the reasons given earlier in this section. I therefore do not discuss Deflationary-Friendly Primitive Relative Naturalness in further detail. On the other hand, if primitive, relative naturalness became standard, it is helpful to know that my deflationary-friendly strategy could proceed in an analogous way.

11.8 Conclusion

I have undertaken a review of some problems with Lewis's Relative Naturalness Definition. I have sought to present solutions to these problems, and highlighted the costs that come with those solutions.

It is worth repeating that these problems are not special problems for my Deflationary-Friendly Naturalness. Any naturalness theorist who wants a notion of relative naturalness must explain what that notion amounts to. Hence, Deflationary-Friendly Naturalness is no better or worse placed on this issue than its rivals.

On the other hand, I want to link grounding to naturalness in Part 3. Moreover, this conceptual link relies on relative naturalness being measured by definitional complexity. I therefore have an interest in defending measures of complexity of perfectly natural definition. This chapter provides that defence, and lays the groundwork for Part 3.

Part III

Chapter 12

Grounding

12.1 Introduction

The purpose of Part 3 of this thesis is to defend a theoretical link between grounding and naturalness.

This is to block grounding-variants of hyperintensional manoeuvre against the application of deflationary methodologies. It will be recalled from ch.2 that hyperintensional manoeuvres work by insisting that an apparently merely verbal dispute is actually substantive because each side asserts contrary positions about what is *fundamentally* the case. Meanwhile, a popular analysis is that a fact is fundamental iff it is ungrounded.

This motivates my interest in grounding. If a deflationary-friendly interpretation of grounding is correct, then this will ‘push through’ to the present analysis of ‘fundamentality’. Fundamentality will be deflationary-friendly, undermining grounding-variants of hyperintensional manoeuvre.

This, then, is the goal of Part 3. The basic strategy is to connect grounding with naturalness, and to then utilise my deflationary-friendly interpretation of naturalness. This friendliness to the deflationist ‘pushes through’ to grounding from naturalness, and from grounding to the present analysis of fundamentality.

We can frame the goals of Part 3 by considering a related argument made by Dasgupta (2017). Dasgupta argues that, if we only want grounding to play ‘the role of *limning many issues of intellectual interest*’ (2017, 16), then grounding needn’t be primitive, a worldly relation or objective. His thought is that these attributes are inflationary and incur a metaphysical cost. Given that these

attributes are not required for grounding to play its limning role, Dasgupta suggests that we might interpret grounding in a less inflationary fashion.

Dasgupta notes that his conclusion – while important – still represents a relatively weak claim. This is because grounding theorists might argue that grounding has more theoretical roles to play than limning issues of intellectual interest. The grounding claims considered in ch.15 suggest further roles for grounding, and, in ch.16, I consider some of these theoretical roles directly.

The goal of Part 3 might therefore be seen as an attempt to strengthen Dasgupta’s conclusion. I want to show that my deflationary-friendly interpretation of grounding allows us to enjoy *all* of grounding’s theoretical benefits, but more cheaply. I conduct a wider survey of how grounding is used and argue that my deflationary-friendly interpretation is consistent with those uses. Though my argument cannot be conclusive – some further uses for grounding may yet be proposed – it represents a much stronger claim than the one Dasgupta advances.

This chapter offers an introduction to what metaphysical grounding amounts to. This provides the basic context by which we can talk about grounding at length. In §12.2, I sketch out the intuitive underpinning behind grounding. In §12.3, I discuss the grammar of ground, whilst in §12.4, I outline its relational properties. In §12.5, I make some distinctions within the concept of ground, and in §12.6, I conclude.

12.2 The Basics of Grounding

I use the convention of using corner quotation marks to denote the fact expressed by the sentence within the quotation marks. For example, ‘ ϕ ’ denotes the fact expressed by the sentence ‘ ϕ ’. Moreover, I use upper case Greek letters such as ‘ Δ ’ to denote a (possibly singleton) set of sentences, and lower case Greek letters such as ‘ ϕ ’ to denote single sentences. ‘ Δ ’ then denotes the set of facts expressed by the set of sentences in Δ .

The intuitive idea behind grounding is that some facts obtain in virtue of other facts. When we say that ‘ ϕ ’ obtains in virtue of ‘ Δ ’, we can rephrase this as the claim that Δ grounds ϕ . For example, grounding theorists claim that, for any individual a , a is red in virtue of being scarlet. Using grounding-talk explicitly, we reformulate this as the claim that (if a is scarlet, then) $\{a$ is

scarlet} grounds a is red.

These two examples are cases of *full* grounding – where the grounded fact obtains *fully* in virtue of the grounding fact. We can distinguish this from *partial* grounding, where the grounded fact obtains *partially* in virtue of the grounding fact. For example, grounding theorists claim that, for any individual a , a is both red and round partially in virtue of being red. We can reformulate this as the claim that (if a is red, then) $\{a \text{ is red}\}$ partially grounds a is red and round.

Grounding provides a partial ordering on the structure of objective reality.¹ The thought is that facts that fully ground other facts are more fundamental. Hence, $\{\psi\}$ fully grounds ϕ only if ' ψ ' is more fundamental than ' ϕ '.

Relatedly, facts that partially ground other facts are *at least as* fundamental. Hence, $\{\psi\}$ partially grounds ϕ only if *it is not the case that* ' ϕ ' is more fundamental than ' ψ '.²

12.3 The Grammar of Ground

I follow Fine (2014) in treating grounding as an operator rather than a relation. This operator links a set of sentences (on the left-hand-side) to a single sentence (on the right-hand-side). It is therefore one-one. I use ' $<$ ' to express (strict) full grounding, such that $\Delta < \phi$ iff Δ (strictly) fully grounds ϕ .

As noted, grounding theorists distinguish full from partial grounding. However, partial grounding ' \leq ' can be defined in terms of strict grounding as follows:

Partial Ground Definition: $\Gamma \leq \psi$ iff there is some Δ such that $\Gamma \cup \Delta < \psi$.

Moreover, following Korbmacher (2016), I adopt a *worldly* rather than *conceptual* conception of ground. Both conceptions take grounding to connect sets of sentences with sentences. However, the worldly conception takes those sentences to express *facts*, whilst the conceptual conception takes those sentences

¹There is some controversy as to whether this partial ordering is well-founded. Dixon (2016) and Litland (2015) argue that there are infinitely descending sequences of ground, and Rosen (2010) expresses agnosticism on the point. Further complicating matters, Dixon (2016) and Rabin & Rabern (2016) note that there is some ambiguity on what it *means* to say that grounding is well-founded. They suggest that grounding might be *both* well-founded *and* such that there are infinite sequences of ground.

²Note that it does not follow from this that, if ϕ is ungrounded, then ' ϕ ' is fundamental. This requires a further theoretical posit characterising fundamentality in terms of ground.

to express *truths*. The worldly conception is thus more coarse-grained than the conceptual conception, as the following example demonstrates. Under the worldly conception, $\lceil \phi \vee \phi \rceil = \lceil \phi \rceil$. The conceptual conception treats the two facts as distinct.

Though the worldly conception is coarser-grained than the conceptual conception, it is nonetheless relatively fine-grained. For example, the worldly conception holds that there are distinct facts that are necessarily equivalent. For example, $\lceil 2 + 2 = 4 \rceil$ is distinct from $\lceil 4 + 4 = 8 \rceil$, despite being coextensive in all possible worlds.

It is not obvious what analysis underlies the difference between the worldly and conceptual conception of ground. The conceptions individuate facts and truths differently. However, it is not obvious that we can provide individuation conditions without appealing to grounding.³ I am not sure whether this is problematic: perhaps grounding is the more primitive notion, and the difference between the two conceptions turns on which grounding claims the theorist takes to be true. For example, the worldly grounding theorist will deny that (if ϕ , then) $\{\phi\} < (\phi \vee \phi)$, whilst the conceptual grounding theorist will claim that it is true.

As it is, my main arguments do not turn on adopting the worldly rather than the conceptual conception of ground, nor do they turn on an analysis of what that distinction amounts to. I therefore bracket these concerns in this thesis.

As the worldly conception takes the grounding operator to hold between sets of sentences and sentences that express facts, it follows straightforwardly that grounding is *factive*. This means that from $\Delta < \phi$ we can conclude that all of $\lceil \Delta \rceil$ obtain, and that $\lceil \phi \rceil$ obtains.

It will aid readability to make use of a conditional grounding operator ' \triangleleft ', such that

$\lceil \Gamma \triangleleft \phi \rceil$ expresses that, if all the facts expressed by sentences in Γ obtain, then $\Gamma < \phi$

Similarly, I use ' \trianglelefteq ' as a conditional *partial* grounding operator, such that

³For example, Korbmacher (2016) provides individuation conditions for facts in terms of factual equivalence (\equiv) and then defines factual equivalence in terms of weak grounding.

‘ $\Gamma \trianglelefteq \phi$ ’ expresses that, if all the facts expressed by sentences in ‘ Γ ’ obtain, then $\Gamma \leq \phi$

By how ‘ \triangleleft ’ and ‘ \trianglelefteq ’ are defined, they inherit the stipulations about ‘ $<$ ’ and ‘ \leq ’ made in this chapter.

Given that the set on the left-hand-side of the grounding operator can contain multiple sentences, we might speak *loosely* of the operator being many-one. Expanding on this thought, we could replace *sets* on the left-hand-side with *plurals*, such that

‘ $\{\phi, \psi\} < \phi \wedge \psi$ ’ becomes ‘ $\phi, \psi < \phi \wedge \psi$ ’.

On occasion, I may loosely speak of plurals instead of sets, where adopting such a convention aids readability. For my purposes, these two manners of speaking are interchangeable. I do not intend any full-blooded, ontological commitment to sets with the convention I adopt.

12.4 The Relational Properties of Ground

Though I treat ground as an operator, we can nonetheless speak of its relational properties. Given that I take grounding to constitute a partial ordering, I treat grounding as irreflexive, asymmetric and transitive.

It is standard to assign these relational properties to ground.⁴ However, there are various controversies regarding these relational properties. Various counterexamples are advanced that challenge the irreflexivity (and thus asymmetry) of ground.⁵ Similarly, some philosophers question whether grounding is transitive.⁶

This lack of consensus might trouble the grounding theorist, but is not problematic for present purposes. We will see that my Ground-Naturalness Connection provides a conceptual link between grounding on one side, and naturalness and certain deductive rules on the other. These deductive rules

⁴This is reflected in Fine’s (2014) introduction to grounding, or in the logics of ground: see Correia (2016), Fine (2014) and Korbacher (2016).

⁵For examples and discussion of the asymmetry of grounding, see Jenkins (2011), Krämer (2013), Lange (2013), Lowe (1998), Paseau (2009), Rodriguez-Pereyra (2015), Trogon (2013) and Wilson (2014). For example, Jenkins notes that a materialist might want to say both that ‘ S is in pain’ = ‘ S is in brain state c ’ and that ‘ $\{S \text{ is in brain state } c\} < S \text{ is in pain}$ ’.

⁶For examples and discussion of the transitivity of grounding, see Clark & Liggins (2012), Lange (2013), Rodriguez-Pereyra (2015), Trogon (2013) and Wilson (2014).

resemble those that govern the logical behaviour of ground. If a consensus is reached whereby grounding is not transitive, these deductive rules can be amended to reflect this consensus and invalidate transitive reasoning.

In addition to these standard relational properties, grounding theorists normally treat grounding as non-monotonic. This means that $\Delta < \phi$ does not imply that $\Delta \cup \{\psi\} < \phi$. For example, from $\{a \text{ is scarlet}\} < a \text{ is red}$, we cannot derive that (if b is round, then) $\{a \text{ is scarlet}, b \text{ is round}\} < a \text{ is red}$. The thought is that *all* of the grounds must be relevant to what is grounded.

12.5 Some Important Definitions

I have made remarks on the grammar and relational properties of full and partial grounding. However, there are further distinctions we can make within the concept of ground.

Strict grounding is the notion that I have been explicating in this chapter. *Weak* grounding is what we get by taking strict grounding and making it reflexive. More precisely, we can define weak grounding as follows:

Weak Grounding: $\{\psi_1, \psi_2, \dots\} < \phi$ iff, for all sentences δ and all sets of sentences Γ , if $\{\phi\} \cup \Gamma < \delta$, then $\{\psi_1, \psi_2, \dots\} \cup \Gamma < \delta$.

In reverse, Korbmacher (2016) demonstrates that we can define strict grounding in terms of weak grounding:

Strict Grounding Definition: $\{\psi_1, \psi_2, \dots\} < \phi$ iff $\{\psi_1, \psi_2, \dots\} < \phi$ and for no ψ_i there is a set of sentences Γ such that $\{\phi\} \cup \Gamma < \psi_i$.

12.6 Conclusion

I am now in a position to proceed with Part 3.

This chapter is intended as elucidatory. It introduces the notion of grounding that I will be working with, and makes explicit some assumptions I make about its grammar and relational properties. Furthermore, the chapter introduces some important distinctions within ground.

I intend for my introduction to be loyal to the existing literature on ground. The next chapter discusses how we might interpret grounding as deflationary-friendly.

Chapter 13

The Ground-Naturalness Connection

13.1 Introduction

The target of this chapter is to introduce a conceptual link between grounding and naturalness. The next chapters of Part 3 then provide evidence for this conceptual link.

In Part 2, I argue that we should adopt a deflationary-friendly interpretation of naturalness. This deflationary-friendliness ‘pushes through’ the conceptual link, such that we should adopt a deflationary-friendly interpretation of ground. In turn, this deflationary-friendliness pushes through to any characterisation of fundamentality in terms of ground. Hence, we will block the route to the grounding-variant of hyperintensional manoeuvre against deflationary methodologies.

To remind the reader from ch.2, the block to the hyperintensional manoeuvre works as follows. Suppose that it is an interest-relative, subjective matter whether ‘ ϕ ’ is fundamental. It follows that finding a disagreement in a dispute over the fundamentality of ‘ ϕ ’ does not save the substantivity of a supposedly objective dispute.

Firstly, however, I should make good on this offer of a conceptual link between grounding and naturalness. I introduce this link, the Ground-Naturalness Connection, in §13.2. The Ground-Naturalness Connection consists of two main, theoretical components: the idea of perfectly natural translation and

certain deductive rules. Each are explicated fully, in §13.3 and §13.5 respectively. In §13.4, I demonstrate that a deflationary-friendly interpretation of naturalness pushes through the Ground-Naturalness Connection, to deliver a deflationary-friendly interpretation of grounding. In §13.6, I conclude the chapter.

13.2 The Ground-Naturalness Connection

I defend the following biconditional in Part 3:

Ground-Naturalness Connection: $\Delta < \phi$ iff there is a $<$ -derivation from the set of natural grounding claims to ' $\Delta < \phi$ '.

I then define 'natural grounding claim' as follows, when ' $\Delta \blacktriangleleft \phi$ ' expresses that 'if all of the facts expressed by the sentences in Δ obtain, then Δ naturally grounds ϕ ' (such that ' \blacktriangleleft ' is the conditional, natural grounding operator):

Natural Grounding Definition: $\Delta \blacktriangleleft \phi$ iff there is a $<$ -derivation of ' $\Lambda < \gamma$ ', when Λ is a set of perfectly natural translations of the sentences in Δ , and γ is some perfectly natural translation of ϕ .

The basic motivation behind the Ground-Naturalness Connection is that we can generate all the grounding claims from certain deductive rules with a starter pack of privileged grounding claims. By appealing to naturalness, we have an extra-logical resource to get the process going.

To help show what is going on, consider the following example. The details of this example will be clearer once I have detailed the notion of perfectly natural translation and our deductive rules, which follows in later sections.

Consider the following claim:

$\{a \text{ is scarlet, } a \text{ is a triangle}\} \blacktriangleleft a \text{ is red} \wedge a \text{ is shaped.}$

When ' $a \text{ is red}$ ' is translated into a perfectly natural language, the property of being red can be translated as an (infinitary) disjunction, each disjunct corresponding to the perfectly natural definition of each shade of red. To simplify matters, suppose that the properties corresponding to each shade of red are perfectly natural. ' $a \text{ is red}$ ' might therefore be translated as $\gamma = 'a \text{ is scarlet} \vee a \text{ is crimson} \vee \dots'$. Suppose that $\Lambda = '\{a \text{ is scarlet}\}'$. Obtaining

disjuncts ground their disjunctions. Hence, we can derive that $\Lambda \triangleleft \gamma$. It follows by Natural Grounding that ‘ $\{a \text{ is scarlet}\} \blacktriangleleft a \text{ is red}$ ’.

Analogous reasoning finds that $\{a \text{ is a triangle}\} \blacktriangleleft a \text{ is shaped}$. When ‘ $a \text{ is shaped}$ ’ is translated into a perfectly natural language, the property of being shaped can be translated as an (infinitary) disjunction, each disjunct corresponding to a different, determinate shape. ‘ $a \text{ is shaped}$ ’ might therefore be translated as $\gamma = ‘a \text{ is a triangle} \vee a \text{ is a rectangle} \vee \dots’$. Suppose that $\Lambda = ‘\{a \text{ is a triangle}\}’$. As obtaining disjuncts ground their disjunctions, $\Lambda \triangleleft \gamma$. It follows by Natural Grounding that ‘ $\{a \text{ is a triangle}\} \triangleleft a \text{ is shaped}$ ’ is a natural grounding claim.

As obtaining conjuncts (jointly) ground their conjunctions, we can derive that:

$$\{a \text{ is red}, a \text{ is shaped}\} \triangleleft a \text{ is red} \wedge a \text{ is shaped}.$$

Meanwhile, we have shown that ‘ $\{a \text{ is scarlet}\} \blacktriangleleft a \text{ is red}$ ’ and ‘ $\{a \text{ is a triangle}\} \blacktriangleleft a \text{ is shaped}$ ’. As grounding is transitive, we can therefore derive from the set of natural grounding claims that

$$\{a \text{ is scarlet}, a \text{ is a triangle}\} \triangleleft a \text{ is red} \wedge a \text{ is shaped},$$

By the Ground-Naturalness Connection, we thus conclude that:

$$\{a \text{ is scarlet}, a \text{ is a triangle}\} \triangleleft a \text{ is red} \wedge a \text{ is shaped}.$$

This is the desired grounding claim. The natural grounding claims provide the resources from which we can generate all grounding claims via certain deductive rules.

13.3 Natural Translations and Grounding

The Ground-Naturalness Connection consists of two main components: some deductive rules, and perfectly natural translation. In §13.5, I discuss our deductive rules in more detail. This section is concerned with explicating the idea of perfectly natural translation.

Lewis’s (1983) notion of naturalness underpins perfectly natural translation. Readers who need a reminder of what naturalness amounts to can consult ch.6 for a fuller explanation.

The perfectly natural properties form a set such that all other properties can be defined in terms of that set. For example, the property of being red might be defined as an infinitary disjunction of wavelengths and frequencies of light.¹ It is built into the notion of naturalness that all properties are definable in terms of perfectly natural properties. When the definition is relatively complex, then we say that the property is *relatively* natural. When the definition is excessively complex, we say that the property is *unnatural*.

A *perfectly natural language* is such that all the predicates in the language refer to perfectly natural properties. As all properties can be defined in terms of perfectly natural properties, it is always possible to translate a sentence in an ordinary language – say, English – into the perfectly natural language. I call this perfectly natural language *Naturalish*. Following the example above, we can translate the English sentence ‘*a* is red’ into the following Naturalish sentence:

a has wave properties $XYZ_1 \vee a$ has wave properties $XYZ_2 \vee a$ has wave properties $XYZ_3 \vee \dots$

This is an infinitary disjunction of wavelengths and frequencies of light (each of which is a perfectly natural property) corresponding to shades of red. This demonstrates that sentences of Naturalish can be infinitary. This means that our deductive rules must be infinitary for the present purpose.

It is also important to note that a sentence may have multiple perfectly natural translations. For example, rather than translate the English sentence ‘*a* is red’ into the Naturalish sentence above, we might instead translate it as:

(*a* has some wavelength between n_1 and n_2) \wedge (*a* has a wave frequency between m_1 and m_2).

when the n and m are numbers. This translation avoids an infinitary Naturalish sentence, but involves quantification. In any case, both sentences are perfectly natural translations of the English ‘*a* is red’, and Natural Grounding does not impose any demand for a *unique* perfectly natural translation:

¹This definition deals with the colour of light rather than the colour of surfaces, which might instead be defined in terms of reflective properties of surfaces.

Natural Grounding Definition: $\Delta \blacktriangleleft \phi$ iff there is a $<$ -derivation of ' $\Lambda < \gamma$ ', when Λ is a set of perfectly natural translations of the sentences in Δ , and γ is *some* perfectly natural translation of ϕ .

13.4 Deflationary-Friendly Naturalness

In Part 2, I argue that the correct interpretation of naturalness is deflationary-friendly. This means, amongst other things, that whether a property is perfectly natural is an interest-relative and subjective affair. This should 'push through' to grounding through the Ground-Naturalness Connection. However, it is worth making sure that this 'push through' is successful, to assure ourselves of the project at hand.

Suppose that it is interest-relative whether a property is perfectly natural. In other words, membership of the set of perfectly natural properties is an interest-relative matter. Which properties are in this set directly affects which perfectly natural translations are available.

To demonstrate this, consider the following toy example. Suppose that we are considering two properties, the property of being green and the property of being grue. It is well-documented that we can define *being grue* in terms of *being green* and *being blue*, but also that we can define *being green* in terms of *being grue* and *being bleen*.² Suppose that the properties of being green and being blue are perfectly natural, and the properties of being grue and being bleen are not perfectly natural. This means that a Naturalish translation of the English '*a* is grue' is '*a* is green until time *t*, and *a* is blue after *t*'. Meanwhile, a Naturalish translation of the English '*a* is green' is '*a* is green', as the sentence is already in perfectly natural terms.

Alternatively, suppose that the properties of being grue and being bleen are perfectly natural, and the properties of being green and being blue are not perfectly natural. This means that a Naturalish translation of the English '*a* is grue' is '*a* is grue' – it is already in perfectly natural terms. However, a Naturalish translation of the English '*a* is green' is '*a* is grue before time *t*, and *a* is bleen after *t*'.

²Goodman (1955) makes this point. We can define 'grue' as 'green before *t* and blue after *t*' for some future *t*. Alternatively, we can define 'green' as 'grue before *t* and bleen after *t*', when an individual is bleen iff it is blue before *t* and green after *t*.

We therefore see that, if it is an interest-relative matter as to which properties are perfectly natural, then the correctness of translations into Naturalish from English is an interest-relative matter. A deflationary-friendly interpretation of naturalness therefore results in a deflationary-friendly interpretation of perfectly natural translation.

This deflationary-friendliness will push through to grounding via the Ground-Naturalness Connection. Note that

$$\{a \text{ is green before } t, a \text{ is blue after } t\} \triangleleft a \text{ is green before } t \wedge a \text{ is blue after } t.$$

This is because obtaining conjuncts (jointly) ground their conjunctions. Consequently, if ‘ a is green before $t \wedge a$ is blue after t ’ is Naturalish for the English ‘ a is grue’, then the Ground-Naturalness Connection implies that:

$$\{a \text{ is green before } t, a \text{ is blue after } t\} \triangleleft a \text{ is grue.}$$

By contrast, if ‘ a is green before $t \wedge a$ is blue after t ’ is *not* Naturalish for the English ‘ a is grue’, then the Ground-Naturalness Connection will *not* imply the grounding claim above. In this case, the thought is that being green and being blue fails to be more fundamental than being grue, and thus the direction of the grounding claim is false.

If the Ground-Naturalness Connection is true and perfect naturalness is an interest-relative matter, then whether

$$\{a \text{ is green before } t, a \text{ is blue after } t\} \triangleleft a \text{ is grue.}$$

is true is itself interest-relative. This provides a deflationary-friendly interpretation of grounding. Consequently, if the Ground-Naturalness Connection holds, a deflationary-friendly interpretation of naturalness will ‘push through’ to grounding.

13.5 Deriving all Grounding Claims from the Natural Grounding Claims

To complete my explication of the Ground-Naturalness Connection, the next step is to provide details on the deductive rules to which I appeal. These deductive rules are used to derive all grounding claims from the natural grounding claims.

We have seen in §13.3 that perfectly natural translations can be infinite in length. For example, a perfectly natural translation of ‘ a is red’ is as follows:

a has wave properties $XYZ_1 \vee a$ has wave properties $XYZ_2 \vee a$ has wave properties $XYZ_3 \vee \dots$

when each set of (perfectly natural) wave properties corresponds to each shade of red. We want our deductive rules to deliver the result that a disjunct grounds an infinitely long disjunction, such that $\{a \text{ has wave properties } XYZ_1\} \triangleleft a \text{ is red}$.

Vocabulary and Grammar

As the following deductive rules involve infinitary reasoning, it is worth introducing some infinitary expressions to those readers who have not come across them before. In addition to the standard logical vocabulary and the (strict) full ground operator ‘ \triangleleft ’, I use the following infinitary vocabulary:

the truth-functional connectives: \wedge , and \vee .

‘ \wedge ’ expresses (possibly infinitary) conjunction. When Γ is a set of sentences, ‘ $\wedge \Gamma$ ’ expresses the (possibly infinite) conjunction of those sentences in Γ . Similarly, ‘ $\vee \Gamma$ ’ expresses the (possibly infinite) disjunction of the sentences in Γ .

As indicated, \wedge and \vee operate on *sets* of formulas rather than formulas themselves. Given that sets can be infinite, this permits infinite conjunctions and disjunctions. I follow the standard notational conventions. This means that, for indexed (possibly infinite) sets of formulas, I also write $\vee_{i \in I} \psi_i$ instead of $\vee\{\psi_i \mid i \in I\}$, and analogously for \wedge . Furthermore, I sometimes write $\psi_1 \vee \psi_2 \vee \dots$ to indicate an infinitely long disjunction, and analogously for infinitely long conjunctions.

Our Deductive Rules

In this thesis, I appeal to the following deductive rules:³

³Note that – by how ‘ \triangleleft ’ is defined – we can use these rules to derive results using \triangleleft . Our deductive rules operate by making a factivity assumption about some sentences, and then deriving results from this assumption.

$$\begin{array}{c}
\frac{\text{for each } i \in I: \phi_i}{\{\phi_i \mid i \in I\} < \bigwedge_{i \in I} \phi_i} \\
\\
\frac{\text{for some } j \in I: \phi_j}{\{\phi_j\} < \bigvee_{i \in I} \phi_i} \\
\\
\frac{\text{for each } i \in I: \Gamma, \phi_i < \psi}{\{\Gamma, \bigvee_{i \in I} \phi_i\} < \psi}
\end{array}$$

The notation ‘for each $i \in I: \phi_i$ ’ should be read as ‘we have established each of the sentences ϕ_i .’ Meanwhile, the horizontal line signifies that we can derive the sentence below from the sentence above. Consequently, each of the rules (taken in order) can be read as follows:

Whenever we have established each of the sentences ϕ_i , we can then derive that the set of sentences ϕ_i strictly fully grounds the (infinitary) conjunction of the sentences ϕ_i .

Whenever we have established some sentence ϕ_j that is one of the sentences ϕ_i , we can then derive that the singleton set containing ϕ_j strictly fully grounds the (infinitary) disjunction of the sentences ϕ_i .

Whenever we have established for each of the sentences ϕ_i that Γ, ϕ_i fully grounds ψ (when Γ is non-empty), we can then derive that the set = $\{\Gamma, \text{the (infinitary) disjunction of the sentences } \phi_i\}$ weakly fully grounds ψ .

In addition, I assume that grounding is

- factive
- non-monotonic
- irreflexive

Take, for example:

$$\frac{\text{for each } i \in I: \phi_i}{\{\phi_i \mid i \in I\} < \bigwedge_{i \in I} \phi_i}$$

From this, we can derive that, from the factivity assumption that the the facts expressed by A, B obtain, we can derive that $\{A, B\} < A \wedge B$. Another way to put this is that:

$$\{A, B\} \triangleleft A \wedge B$$

- asymmetric
- transitive

and derive results accordingly.

It is hoped that these deductive rules will be unobjectionable to most grounding theorists. They can be expressed informally by the following credos:

- Obtaining conjuncts (jointly) ground their conjunctions.
- Obtaining disjuncts ground their disjunctions.
- Whatever, with any disjunct, grounds ψ , also, with their disjunction, weakly grounds ψ .

This kind of reasoning can be found in the works of numerous grounding theorists, such as Fine (2014), Correia (2016) and Schaffer (2016). Though it is a step further to allow *infinitary* applications of these deductions, infinitary reasoning can be explicitly found in the work other grounding theorists, such as Dixon (2016) and Korbmacher (2016). Further, Fine (2014, 47) suggests that the grounding operator can take an ‘infinite number’ of arguments to its ‘left’, and his use of sets when setting out deductive rules for ground is compatible with infinitary reasoning. Correia (2016) similarly has grounding hold between sentences and sets of sentences. Meanwhile, Litland’s (2015) discussion of Dixon’s (2016) use of infinitary associativity tacitly suggests that he has no objection to infinitary reasoning about grounding *in general*.

Additionally, it should be noted that no deflationary-friendly assumptions have been ‘smuggled in’ to this set of deductive rules. The deflationary-friendly aspects of the Ground-Naturalness Connection come from certain interpretations of these rules and ‘<’ (see the next subsection), and from Deflationary-Friendly Naturalness. The substantivist grounding theorist can therefore accept our deductive rules without commitment to the rest of this thesis’s agenda.

With this in mind, I propose that the deductive rules set out should represent acceptable reasoning to most grounding theorists.

Deflationary-Friendly Deductive Rules

Suppose that we accepted that our deductive rules reflect the behaviour of grounding. The worry is that the deflationary-friendliness of the Ground-

Naturalness Connection is then put into doubt. The concern is that the substantivist will be able to make hyperintensional manoeuvres that turn on *purely logical* matters of grounding. Given that purely logical grounding is not mediated through Deflationary-Friendly Naturalness – it is provided solely by our deductive rules – we cannot make sense of such a reformulated dispute being deflatable. The thought is that a dispute over the correctness of those rules can only be understood as a dispute over whether the rules adequately capture some objective phenomenon of metaphysical grounding.

However, this concern can be downplayed. The first thought is that restricting the substantivist to *purely logical* grounding-variants of hyperintensional manoeuvre is a significant limitation. Purely logical grounding-variants of hyperintensional manoeuvre can only preserve the substantivity of disputes that turn on purely logical matters of ground. My contention is that these are relatively rare outside explicit disputes about the logic of ground. Meanwhile, explicit disputes about the logic of ground are relatively unlikely to be targeted by deflationists: simply because they are about the pure logic of ground, and these are of less interest to those inclined to deflate disputes about non-logical grounding. Hence, it is not obvious that purely logical grounding-variants of hyperintensional manoeuvre will preserve many disputes that are *actually* threatened by deflationary heuristics.

The second thought is that, even once we conceive of a dispute that might be preserved by purely logical grounding-variants of hyperintensional manoeuvre, it is not obvious that such a hyperintensional manoeuvre would be endorsed by any actual substantivist. To demonstrate this point, consider a metaphysical dispute over whether there exists the cosmos, or whether there exist individual parts of the cosmos. The deflationist is likely motivated to challenge this dispute as deflatable, employing deflationary heuristics against it. Let us suppose that she makes a plausible case against the substantivity of the dispute.

To avoid this result, the substantivist makes a hyperintensional manoeuvre. She reformulates the dispute as about whether the existence of the cosmos grounds the existence of the individual parts, or vice versa. The thought is that the disputants disagree on whether the cosmos or its parts are more *fundamental*, and that this question of relative fundamentality is expressed as a disagreement over grounding. This reformulates the dispute as about what is called *priority monism*.

Suppose, however, that the substantivist accepts the deflationary-friendliness of (not purely logical) grounding. To defend the dispute, she is therefore minded to present this move as a *purely logical grounding-variant* of hyperintensional manoeuvre. With this in mind, she suggests that we express the existence of the cosmos by a conjunction of existence-claims about its individual parts, when existence is expressed by the existential quantifier. To demonstrate this idea, take the following toy example. In this example, there exist only two individuals in the cosmos, a and b . We might therefore express the existence of the cosmos as follows:

$$\exists x(x = a) \wedge \exists x(x = b).$$

The disagreement over whether the cosmos or its parts are more fundamental, then, is captured in disagreement over which of the following grounding claims is true:

$$\{\exists x(x = a), \exists x(x = b)\} < \exists x(x = a) \wedge \exists x(x = b); \text{ or}$$

$$\{\exists x(x = a) \wedge \exists x(x = b)\} < \exists x(x = a).$$

The dispute therefore turns on whether the following rule *really* reflects the behaviour of grounding:

$$\frac{\text{for each } i \in I: \phi_i}{\{\phi_i \mid i \in I\} < \bigwedge_{i \in I} \phi_i}$$

This is a purely logical grounding-variant of hyperintensional manoeuvre: it reformulates the original dispute as one about the pure logic of ground. The dispute appears substantive, because there is no way to make sense of the reformulated dispute unless we accept that our deductive rules are meant to reflect some external, objective phenomenon of grounding.

The trouble for the substantivist is that this particular manoeuvre will not be endorsed by any priority monist I know of. Priority monists do not deny that conjuncts (jointly) ground their conjunctions. Schaffer (2010) argues for monism on the basis of claims about quantum physics and emergent properties. His arguments do not commit him to the claim that conjunctions ground their conjuncts, for example, that

$$\{a \text{ is red} \wedge a \text{ is round}\} \triangleleft a \text{ is red}, a \text{ is round}.$$

Indeed, Schaffer's (2016) discussion of 'conjunctive-type dependence' heavily implies that he would reject such a claim.

This, then, is the challenge. It is not enough for the substantivist to present a dispute that is the actual target of a deflationary heuristic, such that the substantivity of that dispute can be preserved by a purely logical grounding-variant of hyperintensional manoeuvre. They must *also* demonstrate that such a hyperintensional manoeuvre would be plausibly endorsed by a substantivist. My contention is that it will transpire that purely logical grounding-variants of hyperintensional manoeuvre will find little use.

This severely limits the risk posed by deflationary-unfriendly, purely logical grounding. This thesis aims to defend deflationary heuristics from hyperintensional manoeuvres, focusing on deflationary heuristics *as actually applied to actual, philosophical disputes*. It is not obvious that purely logical, grounding-variants of hyperintensional manoeuvre threaten such applications of deflationary heuristics. Hence, I might unconcernedly accept that *purely logical* grounding is deflationary-unfriendly, and treat our rules as aiming to reflect the external phenomenon of metaphysical grounding. Impurely logical grounding is mediated through deflationary-friendly naturalness by the Ground-Naturalness Connection, which is sufficient to defang any *applied* grounding-variant of hyperintensional manoeuvre.

Hence, even if our deductive rules reflect a deflationary-unfriendly notion of logical grounding, it is not crucial for my thesis to avoid this result. On the other hand, we can also downplay the thought that the use of our deductive rules is deflationary-unfriendly.

The apparent problem began by treating our deductive rules as reflecting some external, metaphysically substantive phenomenon. We can therefore prevent the problem from getting started by resisting the claim that these rules *do* reflect such a phenomenon.

Consider again our deductive rules:

$$\frac{\text{for each } i \in I: \phi_i}{\{\phi_i \mid i \in I\} < \bigwedge_{i \in I} \phi_i}$$

$$\frac{\text{for some } j \in I: \phi_j}{\{\phi_j\} < \bigvee_{i \in I} \phi_i}$$

$$\frac{\text{for each } i \in I: \Gamma, \phi_i < \psi}{\{\Gamma, \bigvee_{i \in I} \phi_i\} < \psi}$$

According to a deflationary-friendly interpretation of these rules, ‘<’ is interpreted as a certain kind of explanation, whereby the logically simple is <-prior to the logically complex.⁴ For example, we see that disjuncts are <-prior to their disjunctions with

$$\frac{\text{for some } j \in I: \phi_j}{\{\phi_j\} < \bigvee_{i \in I} \phi_i}$$

By this interpretation of ‘<’, our rules reflect a certain, subjective prejudice of grounding-theorists to favour logically simpler sentences as explanatorily prior. Note that it is not obvious that the logically complex cannot explain the logically simple, in some contexts. To motivate this point, suppose that we have a chemist and her apprentice. They are studying an unknown substance, which they have found to exemplify chemical properties *XYZ*. The chemist explains to her apprentice that the substance has these chemical properties because it is iron. Meanwhile, we can assume that the property of being iron is defined as a conjunction of these chemical properties. I see no reason to deny that this is genuinely explanatory for her apprentice in this context. The apprentice knows that iron has certain chemical properties, but did not know that the substance was iron. Hence the exemplification of these chemical properties is explained by the substance being iron. As such, the truth of some conjuncts is explained by the truth of their conjunction.

It might be objected that I am talking about different senses of the word ‘explanation’.⁵ Hence, it is not that there is a subjective preference about the relative logical simplicity of *explanandums* and *explanans*, but instead that there is one sense of ‘explanation’ from the logically simple to the logically complex, and another sense of ‘explanation’ from the logically complex to the logically simple.⁶ However, this does not undermine the overall point, because it is not clear that one sense of ‘explanation’ is objectively better than another. That there are multiple (plausible) senses of ‘explanation’ seems to evidence the point that any particular sense of ‘explanation’ is only of interest-relative value.

⁴Note that a deflationary-friendly interpretation of ‘<’ will result in a deflationary-friendly interpretation of ‘<’, ‘<’ and ‘<’, by how they are defined.

⁵My thanks to Jon Litland and Michael Potter for raising this point.

⁶For example, a Humean view of laws might take logically complex laws to explain their logically simpler instances.

Consequently, suppose that our deductive rules simply reflect a subjective prejudice about explanatory priority. As this prejudice is *subjective*, it follows that our rules are reflecting a phenomenon that is deflationary-friendly.

To demonstrate this, consider again the toy example dispute over whether the cosmos or its parts exist. The substantivist makes a hyperintensional manoeuvre, reformulating this dispute as a dispute over whether the cosmos or its parts are more *fundamental*. They offer a *purely logical* grounding-variant of hyperintensional manoeuvre, such that the dispute is over which of the following claims is true:

$$\{\exists x(x = a), \exists x(x = b)\} < \exists x(x = a) \wedge \exists x(x = b); \text{ or}$$

$$\{\exists x(x = a) \wedge \exists x(x = b)\} < \exists x(x = a).$$

Hence, the dispute is reformulated as about the correctness of our deductive rules. However, if our rules merely reflect a subjective prejudice about the explanatory priority of logically simple sentences, then this reformulated dispute remains deflatable. Both disputants will agree that conjuncts are logically simpler than their conjunctions. Because of this agreement, the reformulated dispute is trivially settled: the first claim is true, and the second claim is false. On the other hand, nothing metaphysically substantive follows from this conclusion. The substantivist has failed to protect the substantivity of the dispute with their hyperintensional manoeuvre.

Before moving on, it is worth summarising the points of this subsection. The substantivist argues that our deductive rules reflect a deflationary-unfriendly notion of purely logical grounding. My first response is that they may be right – but that purely logical, grounding-variants of hyperintensional manoeuvre have limited application. Hence, it does not matter if purely logical grounding *is* deflationary-unfriendly, for the purposes of my thesis. My second response is that we can challenge the idea that our rules reflect deflationary-unfriendly, purely logical grounding. Instead, we can see our rules as defining the logical behaviour of a subjectively important kind of explanation from the logically simple to the logically complex.

Hence, we needn't worry about the apparent deflationary-unfriendliness of our deductive rules.

A Stipulation

For the rest of the thesis, I define ‘<-derivable’ as follows:

There is a <-derivation from Γ to sentence ϕ iff, from Γ , we can use our deductive rules to derive that ϕ .

A sentence that is <-derivable from nothing is simply ‘<-derivable’.

These stipulations are designed to aid readability. The idea of <-derivability is not supposed to involve a commitment to any full, logical system.

Armed with these definitions, we can state the Ground-Naturalness Connection as follows:

Ground-Naturalness Connection: $\Delta \triangleleft \phi$ iff there is a <-derivation from the set of natural grounding claims to ‘ $\Delta \triangleleft \phi$ ’.

and

Natural Grounding Definition: $\Delta \blacktriangleleft \phi$ iff there is a <-derivation of ‘ $\Lambda < \gamma$ ’, when Λ is a set of perfectly natural translations of the sentences in Δ , and γ is some perfectly natural translation of ϕ .

13.6 Conclusion

This chapter explicates the apparatus underpinning the Ground-Naturalness Connection. This apparatus consists of two halves: the idea of perfectly natural translation, and our deductive rules by which we derive all grounding claims from the natural grounding claims.

The Ground-Naturalness Connection is a biconditional, and it is not intended as an *analysis* of grounding. This means, among other things, that neither side of the biconditional needs to be more explanatory than the other, and that it does not matter if the Ground-Naturalness Connection is circular. A biconditional can be true despite being unexplanatory and circular. However, if it is true then the Ground-Naturalness Connection allows me to reach a deflationary-friendly interpretation of grounding from a deflationary-friendly interpretation of naturalness.

The rest of Part 3 provides arguments for thinking that the Ground-Naturalness Connection is true. This allows me to proceed with my thesis and defend deflationary heuristics from grounding-variants of hyperintensional manoeuvre. The next chapter considers conceptual links between grounding, naturalness and our deductive rules.

Chapter 14

Conceptual Links

14.1 Introduction

The last chapter presented the Ground-Naturalness Connection. In this chapter, I begin the task of evidencing the biconditional, focusing on direct, conceptual links between grounding, naturalness and our deductive rules.

In §14.2, I provide argument for the right-to-left direction of the Ground-Naturalness Connection. I propose that this takes the form of a proof, rather than merely *supporting* this direction of the biconditional.

In §14.3, I consider theoretical considerations that support the left-to-right (and right-to-left) direction of the Ground-Naturalness Connection. The idea is that our deductive rules tracks the features of ground, and Naturalish makes explicit grounding claims that were otherwise ‘hidden’ from those rules. In §14.4, I conclude.

In this chapter, I make extensive use of square brackets ‘ \lceil ’ and ‘ \rceil ’ to denote *facts*. It will be recalled from §12.2 that ‘ $\lceil\phi\rceil$ ’ denotes the fact expressed by the sentence ‘ ϕ ’. I also make use of ‘ \rightleftharpoons ’ to denote factual equivalence. The thought is that $\phi \rightleftharpoons \psi$ iff $\lceil\phi\rceil = \lceil\psi\rceil$.

14.2 From Right to Left

The right-to-left direction of the Ground-Naturalness Connection is provable, from some plausible assumptions. In this section I offer this proof. To clarify, the claim is that

If there is a $<$ -derivation from the set of natural grounding claims to ' $\Delta \triangleleft \phi$ ', then $\Delta \triangleleft \phi$.

This claim follows from two observations: that our deductive rules reflect the nature of grounding, and that a sentence and its perfectly natural translation express the same fact.

I argue in §13.5 that the grounding theorist should be in a position to accept our deductive rules as reflecting the nature of ground. They should therefore accept $<$ -derivations as sound.

Meanwhile, suppose that the Naturalish translation of Δ is Λ , and the Naturalish translation of ϕ is γ . Suppose further that we can $<$ -derive that $\Lambda \triangleleft \gamma$. This means that $\Delta \blacktriangleleft \phi$. This follows immediately from the definition of natural grounding, given below:

Natural Grounding Definition: $\Delta \blacktriangleleft \phi$ iff there is a $<$ -derivation of ' $\Lambda \triangleleft \gamma$ ', when Λ is a set of perfectly natural translations of the sentences in Δ , and γ is some perfectly natural translation of ϕ .

As our deductive rules are unobjectionable to the grounding theorist, it should be accepted by such theorists that

If ' $\Lambda \triangleleft \gamma$ ' is $<$ -derivable, then $\Lambda \triangleleft \gamma$.

Meanwhile, we know that the following factual equivalences hold:¹

$(\Lambda \rightleftharpoons \Delta)$ and $(\gamma \rightleftharpoons \phi)$.

As grounding holds between *facts*, it follows that

$\Lambda \triangleleft \gamma$ iff $\Delta \triangleleft \phi$.

Hence, it follows that grounding theorists should accept that

If ' $\Lambda \triangleleft \gamma$ ' is $<$ -derivable, then $\Delta \triangleleft \phi$.

¹We have previously defined factual equivalence between sentences. We can extend this definition to sets, such that ' $\Lambda \rightleftharpoons \Delta$ ' expresses that

A sentence ϕ is in Λ only if there is a sentence ψ in Δ such that $\phi \rightleftharpoons \psi$; AND a sentence ϕ is in Δ only if there is a sentence ψ in Λ such that $\phi \rightleftharpoons \psi$.

This means that if a sentence ψ is a natural grounding claim, then ψ is a true grounding claim. I am trying to prove the following:

If there is a $<$ -derivation from the set of natural grounding claims to ' $\Delta \triangleleft \phi$ ', then $\Delta \triangleleft \phi$.

I have argued that grounding theorists should accept that $<$ -derivations are sound and that all natural grounding claims are true. As $<$ -derivations are sound, they cannot derive falsity from truth. Hence, if there is a $<$ -derivation from the set of natural grounding claims to ' $\Delta \triangleleft \phi$ ', then ' $\Delta \triangleleft \phi$ ' should be accepted as true by grounding theorists. This delivers the right-to-left direction of the Ground-Naturalness Connection.

Note that the substantivist grounding theorist will interpret $<$ -derivation in a deflationary-unfriendly way: as derivations about grounding. It might be thought that this threatens the deflationary-friendliness of my account. However, this is not so. The point is that any grounding claim $<$ -derived from the set of natural grounding claims should be accepted as true *even by substantivist grounding theorists*.² Meanwhile, in §13.5, I demonstrated how deflationists can use $<$ -derivations without accepting deflationary-unfriendly consequences.

14.3 From Left to Right

Much of Part 3 is engaged in arguing for the left-to-right direction of the Ground-Naturalness Connection, namely that

Ground-Naturalness Connection: If $\Delta \triangleleft \phi$, then there is a $<$ -derivation from the set of natural grounding claims to ' $\Delta \triangleleft \phi$ '.

Unlike the right-to-left direction, this claim does not admit of a proof. The right-to-left direction appeals to the rule-soundness of each of our natural deduction rules. The left-to-right direction requires something like a Completeness Theorem for our natural deduction rules, which I am not in a position to offer.

Instead, throughout Part 3, I offer an inductive argument for the left-to-right direction of the Ground-Naturalness Connection. For example, in ch.15,

²Note that any sentence ϕ in the set of natural grounding claims is such that the set of natural grounding claims $\triangleleft \phi$ (and the set of natural grounding claims $\blacktriangleleft \phi$).

I consider a number of paradigmatic grounding claims. For each such grounding claim $\Delta \triangleleft \phi$, I argue that ' $\Delta \triangleleft \phi$ ' is \triangleleft -derivable from the set of natural grounding claims.³ In ch.16, I consider further, theoretical applications of grounding and argue that the successful applications are preserved under the Ground-Naturalness Connection. This inductive argument evidences the conclusion that the Ground-Naturalness Connection captures anything that the substantivist wants to capture with grounding.

In this section, I want to support those results with general, conceptual reasons for thinking that the left-to-right direction of the Ground-Naturalness Connection is true. These reasons support the Ground-Naturalness Connection and hopefully – at least – make the successes of later chapters unsurprising.

We can motivate the left-to-right direction by thinking of grounding as a restricted supervenience relation. Supervenience has been offered as the relation of metaphysical dependence, but, as Leuenberger (2013, 228) notes, this idea has 'widely gone out of favour'. Leuenberger offers the following assessment:

First, the target notions of determination and dependence are hyperintensional, while supervenience is not. As a consequence, supervenience fails to make any discrimination in the realm of the non-contingent. Second, the target notions are asymmetric. Supervenience, in contrast, fails to be asymmetric (228).

We can demonstrate these points with a couple of examples. 'There are infinitely many natural numbers' supervenes on 'Sherbie is a cat', but the former does not seem to metaphysically *depend* on the latter. Meanwhile, ' A ', ' B ' collectively supervene on ' $A \wedge B$ ', but metaphysicians typically want to deny that conjuncts metaphysically depend on their conjunctions.

Hence, it is not a necessary condition of ' A ' supervening on ' B ' that $\{B\} < A$. However, the latter *is* a sufficient condition of the former. This is because grounding necessitates, that is:

If $\Delta < \phi$, then $\Box(\Delta \rightarrow \phi)$.

³Or that the Ground-Naturalness Connection tracks plausible reasons to doubt the grounding claim.

This suggests that grounding is a restriction of supervenience. In addition to these restrictions, we should also note that grounding is factive whilst supervenience is not. Hence, the thought is that

Building Grounding: $\Delta \triangleleft \phi$ iff

1. ' ϕ ' supervenes on ' Δ '; and
2. All of ' Δ ' are relevant to the obtaining of ' ϕ '; and
3. All of ' Δ ' are more fundamental than ' ϕ '.⁴

Our use of ' \triangleleft ' reflects the restriction of factivity. Clause (2) allows grounding to discriminate 'in the realm of the non-contingent', because not all facts are relevant to the obtaining of necessary facts. Clause (3) makes grounding asymmetric, because relative fundamentality is an asymmetric relation.

From there, the idea is that there are conceptual links between these clauses, and the appeals to naturalness and our deductive rules. I argue that the desired, restricted supervenience relation is provided by \triangleleft -derivation from the set of natural grounding claims. Remember that

Natural Grounding Definition: $\Delta \blacktriangleleft \phi$ iff there is a \triangleleft -derivation of ' $\Lambda \triangleleft \gamma$ ', when Λ is a set of perfectly natural translations of the sentences in Δ , and γ is some perfectly natural translation of ϕ .

It follows straightforwardly from this definition that any natural grounding claim $\Delta \blacktriangleleft \phi$ can be translated into an equivalent, Naturalish natural grounding claim $\Lambda \blacktriangleleft \gamma$.⁵ I return to this point shortly.

Meanwhile, our deductive rules preserve *supervenience*, *relevance* and the direction of *relative fundamentality*. For example, our three rules do not allow us to derive that

$$\{\phi \vee \psi\} \triangleleft \psi,$$

tracking the idea that ' ψ ' does not supervene on ' $\{\phi \vee \psi\}$ '. Further, we can see that any appropriate addition to our natural deduction rules should not license such a derivation. The same thought applies to the derivation of

⁴This is not intended as an *analysis* of grounding – for example, the biconditional uses the notion of relative fundamentality, which grounding theorists might want to analyse in terms of grounding.

⁵The grounding claims are *equivalent* in the sense that they express the same grounding relation between the same facts.

$$\{\phi, \psi\} \triangleleft (\phi \vee \pi),$$

tracking the idea that the obtaining of ψ is irrelevant to the obtaining of $(\phi \vee \pi)$. Finally, the same holds for deriving that

$$\{\phi \wedge \psi\} \triangleleft \phi, \psi,$$

tracking the idea that ' $\phi \wedge \psi$ ' is less fundamental than ' $\{\phi, \psi\}$ '.

More generally, our deductive rules are meant to reflect the behaviour of grounding. We know that, if $\Delta \triangleleft \phi$, then ' ϕ ' supervenes on the ' Δ '. Further, grounding preserves relevance. This is why it is non-monotonic: the thought is that, if $\Delta \triangleleft \phi$, then *all* of ' Δ ' must be relevant to the obtaining of ' ϕ '. Finally, grounding is supposed to track the direction of relative fundamentality. If $\Delta \triangleleft \phi$, then all of ' Δ ' are more fundamental than ' ϕ '.

Hence, grounding preserves supervenience, relevance and the direction of relative fundamentality. Our deductive rules reflect the behaviour of grounding. Therefore, it should be no surprise that \triangleleft -derivation preserves supervenience, relevance and the direction of relative fundamentality.⁶

Hence:

<-Derivation Simpliciter Restrictions: If ' $\Delta \triangleleft \phi$ ' is \triangleleft -derivable, then

1. ' ϕ ' supervenes on ' Δ '; and
2. All of ' Δ ' are relevant to the obtaining of ' ϕ '; and
3. All of ' Δ ' are more fundamental than ' ϕ '.

However, we want to expand this result beyond what is \triangleleft -derivable *simpliciter*. Our deductive rules are limited by the language it is used with. For

⁶Note that using our deductive rules to track these features does not commit us to an inflationary semantics of ground. In §13.5, I argued that our deductive rules should be interpreted as reflecting a certain conception of explanation, in which the logically complex is to be explained by what is logically simpler. This is a deflationary-friendly interpretation, because insisting on this direction of explanation is only of interest-relative value. This conception of explanation also preserves supervenience, relevance and relative fundamentality. If Δ *fully* explains ϕ , then ' ϕ ' supervenes on ' Δ '. An explanation of ϕ must be relevant to ϕ . Finally, because this conception takes the logically complex to be explained by what is logically simpler, it seems to follow that logically simpler sentences explain logically complex sentences constructed out of those logically simpler sentences. From this, most grounding theorists should accept that this conception of explanation tracks relative fundamentality. This is because it is a common assumption made by grounding theorists that sentential components of logically complex sentences express more fundamental facts than the facts expressed by those logically complex sentences.

example, we cannot use our deductive rules to derive that ‘ $\{a \text{ is scarlet}\} \triangleleft a \text{ is red}$ ’, because our deductive rules do not ‘know’ the connections between *being scarlet* and *being red*. Hence, it cannot tell us through *<-Derivation Simpliciter* Restrictions that ‘ $a \text{ is red}$ ’ supervenes on ‘ $a \text{ is scarlet}$ ’, that ‘ $a \text{ is scarlet}$ ’ is relevant to ‘ $a \text{ is red}$ ’, or that ‘ $a \text{ is scarlet}$ ’ is more fundamental than ‘ $a \text{ is red}$ ’. Let us say that such grounding claims are *hidden* from our deductive rules. Meanwhile, grounding claims that are not hidden from our deductive rules are *known* by them.

This is why I appeal to naturalness. Translating into Naturalish provides a way for our deductive rules to know grounding claims that were otherwise hidden. In Naturalish, all these implicit connections are made explicit for our rules. For example, suppose (for simplicity) that the properties corresponding to shades of red are perfectly natural, and that the property of being red is not perfectly natural. We might therefore give the following Naturalish translation of ‘ $a \text{ is red}$ ’:

‘ $a \text{ is scarlet} \vee a \text{ is crimson} \vee \dots$ ’

The Naturalish translation makes explicit the connections between scarlet and red. Importantly, English sentences referring to less natural properties are translated into *more logically complex* Naturalish sentences than English sentences referring to more natural properties. Translation into Naturalish therefore cooperates with our deductive rules in tracking relations of relative fundamentality between facts.

The following is *<-derivable*:

‘ $\{a \text{ is scarlet}\} \triangleleft a \text{ is scarlet} \vee a \text{ is crimson} \vee \dots$ ’

Naturalish translations thus transform genuine grounding claims into what is *<-derivable*, to which the results of *<-Derivation Simpliciter* Restrictions apply.

To complete the picture, we note that equivalences hold between facts. Take an arbitrary *natural* grounding claim: $\Delta \triangleleft \phi$. As noted, we can translate this claim into a Naturalish sentence ‘ $\Lambda \triangleleft \gamma$ ’, which is *<-derivable*. Also note that

($\Lambda \rightleftharpoons \Delta$) and ($\gamma \rightleftharpoons \phi$).

It follows that

1. ' γ ' supervenes on ' Λ ' iff ' ϕ ' supervenes on ' Δ '; *and*
2. All of ' Λ ' are relevant to the obtaining of ' γ ' iff all of ' Δ ' are relevant to the obtaining of ' ϕ '; *and*
3. All of ' Λ ' are more fundamental than ' γ ' iff all of ' Δ ' are more fundamental than ' ϕ '.

As $\Lambda \triangleleft \gamma$ is \triangleleft -derivable, we know from \triangleleft -Derivation *Simpliciter* Restrictions that

1. ' γ ' supervenes on ' Λ '; *and*
2. All of ' Λ ' are relevant to the obtaining of ' γ '; *and*
3. All of ' Λ ' are more fundamental than ' γ '.

From the factual equivalences we have seen, it follows that

1. ' ϕ ' supervenes on ' Δ '; *and*
2. All of ' Δ ' are relevant to the obtaining of ' ϕ '; *and*
3. All of ' Δ ' are more fundamental than ' ϕ '.

This result is obtained despite $\Delta \triangleleft \phi$ (potentially) not being \triangleleft -derivable.

' $\Delta \triangleleft \phi$ ' is an *arbitrary* natural grounding claim. Hence, we can generalise, such that

Natural Grounding Restrictions: If $\Delta \triangleleft \phi$, then

1. ' ϕ ' supervenes on ' Δ '; *and*
2. All of ' Δ ' are relevant to the obtaining of ' ϕ '; *and*
3. All of ' Δ ' are more fundamental than ' ϕ '.

We therefore know that the natural grounding claims track supervenience, relevance and the direction of relative fundamentality. We also know that our deductive rules preserve supervenience, relevance and the direction of relative fundamentality. We can thus extend the result of Natural Grounding Restrictions:

Restrictions Conditional: If ' $\Delta \triangleleft \phi$ ' is \triangleleft -derivable from the set of natural grounding claims, then

1. ' ϕ ' supervenes on ' Δ '; *and*

2. All of ' Δ ' are relevant to ' ϕ '; *and*
3. All of ' Δ ' are more fundamental than ' ϕ '.

Additionally, it is plausible that these three clauses are jointly *sufficient* for ' $\Delta \triangleleft \phi$ ' to be $<$ -derivable from the set of natural grounding claims. That is, it is plausible that there is no instance where the three clauses are met and it is not the case that ' $\Delta \triangleleft \phi$ ' is $<$ -derivable from the set of natural grounding claims.⁷

Hence:

Restrictions Biconditional: ' $\Delta \triangleleft \phi$ ' is $<$ -derivable from the set of natural grounding claims iff

1. ' ϕ ' supervenes on ' Δ '; *and*
2. All of ' Δ ' are relevant to the obtaining of ' ϕ '; *and*
3. All of ' Δ ' are more fundamental than ' ϕ '.

If we can 'build' grounding in the manner suggested by Building Grounding, it follows that we can 'build' grounding from the $<$ -derivability of ' $\Delta \triangleleft \phi$ ' from the set of natural grounding claims, delivering the Ground-Naturalness Connection:

Ground-Naturalness Connection: $\Delta \triangleleft \phi$ iff there is a $<$ -derivation from the set of natural grounding claims to ' $\Delta \triangleleft \phi$ '.

This provides an argument for the left-to-right direction (*and* the right-to-left direction) of the Ground-Naturalness Connection.

14.4 Conclusion

I am now in a position to conclude this chapter.

I have argued that the right-to-left direction of the Ground-Naturalness Connection is provable from plausible assumptions. I have also argued that

⁷It must be admitted that I have not offered much evidence for this claim. However, much of Part 3 acts as a *challenge* to the substantivist: for them to show that there is some use for grounding that the Ground-Naturalness Connection fails to capture. In the same spirit, I offer my sufficiency claim as a challenge to the substantivist: for them to find an instance where the three clauses are met and it is not the case that ' $\Delta \triangleleft \phi$ ' is $<$ -derivable from the set of natural grounding claims.

the Ground-Naturalness Connection follows from a plausible understanding of grounding as some kind of restricted, supervenience relation. Throughout, I have relied on conceptual connections between grounding, naturalness and our deductive rules.

In §14.3, I provided an argument for the left-to-right direction (and the right-to-left direction) of the Ground-Naturalness Connection, but I do not think that it constitutes a *proof*. This is because it depends on the idea that grounding can be constructed by adding restrictions to supervenience. I think that this idea is plausible, but it is not obvious how I would prove this, other than showing that the restricted supervenience relation – that is, what is provided by \prec -derivability from the set of natural grounding claims – is coextensive with grounding.

Further, Restrictions Biconditional rests on the claim that its three clauses are jointly sufficient for ' $\Delta \prec \phi$ ' to be \prec -derivable from the set of natural grounding claims. Again, I contend that this claim is plausible. However, it is not obvious how it might be *proved* that no counterexample exists.

Hence, the argument of §14.3 should be seen as an argument *supporting* the left-to-right direction of the Ground-Naturalness Connection. The rest of Part 3 builds on this support. The next chapter considers paradigmatic grounding claims, and argues that true, paradigmatic claims $\Delta \prec \phi$ are such that ' $\Delta \prec \phi$ ' is \prec -derivable from the set of natural grounding claims. This builds a case for grounding being coextensive to what is provided by ' $\Delta \prec \phi$ ' is \prec -derivable from the set of natural grounding claims, as the left-to-right direction of the Ground-Naturalness Connection asserts.

Chapter 15

Paradigmatic Examples of Grounding

15.1 Introduction

The first half of Part 3 introduced the biconditional connecting grounding with naturalness, the Ground-Naturalness Connection. Continuing from ch.14, I now evaluate the Ground-Naturalness Connection and make a case for thinking that it is true.

This chapter looks at a variety of paradigmatic grounding claims in the literature, and checks whether the Ground-Naturalness Connection is vindicated by those grounding claims. It is vindicated if, for any paradigmatic example of ground ' $\Delta \triangleleft \phi$ ', that ' $\Delta \triangleleft \phi$ ' is \triangleleft -derivable from the set of natural grounding claims.

In addition to *vindicating* these paradigmatic grounding claims, the Ground-Naturalness Connection often provides a *diagnostic* of grounding controversies. By this, I mean the following. Thinking of controversial grounding claims in terms of the Ground-Naturalness Connection can make explicit where the controversy arises. This constitutes a theoretical benefit for the Ground-Naturalness Connection, and I flag these cases where they appear.

This focuses on the left-to-right direction: ensuring that certain grounding claims are vindicated by the Ground-Naturalness Connection. In ch.14, I defended the right-to-left direction of the biconditional.

In §15.2, I present the paradigmatic grounding claims in the literature and

discuss some grammatical issues with their presentation. In §15.3, I consider those examples which share the feature of multiple realisability: the thought being that what is grounded is multiply realisable, and what is grounding is one of those realisations. In §15.4, I consider some examples that are quite directly vindicated by the Ground-Naturalness Connection. In §15.5, I consider the (ungrammatical) claim that the law \langle a given act is illegal, and argue that there are reasons to be doubtful about these kinds of examples. In §15.6, I argue that the claim ‘{particle is acted on with net positive force} \triangleleft the particle accelerates’ produces a puzzle for grounding theorists. In §15.7, I consider grounding claims involving existence and suggest that it requires stipulating that Naturalish does not contain names. In §15.8, I consider set-theoretic grounding claims and suggest that the Ground-Naturalness Connection is supplemented with a clause for set-theoretic talk. Throughout, I defend the thought that something like the Ground-Naturalness Connection is vindicated, and, in §15.9, I conclude.

15.2 Testing the Biconditional

A useful test of the Ground-Naturalness Connection is to check whether paradigmatic, relatively uncontentious examples of grounding are preserved. The thought is that, if it is widely held that $\Delta \triangleleft \phi$, then ‘ $\Delta \triangleleft \phi$ ’ is \triangleleft -derivable from the set of natural grounding claims.

With this in mind, I consider a (non-exhaustive) list of common grounding claims, taken from the contemporary literature on grounding:

1. Categorical features \triangleleft dispositional features.¹
2. A feature C of an act is wrong \triangleleft the act is wrong.²
3. Non-normative features \triangleleft normative features.³
4. Non-aesthetic features \triangleleft aesthetic features.⁴
5. Determinates \triangleleft determinables.⁵
6. Physical events \triangleleft mental events.⁶

¹See Audi (2014), Clarke & Liggins (2012) and Rosen (2010).

²See Fine (2014) and Rosen (2010).

³See Audi (2012, 2014), Clarke & Liggins (2012), and Schaffer (2009a).

⁴See Audi (2014).

⁵See Audi (2012) and Rosen (2010).

⁶See Clarke & Liggins (2012), deRosset (2013), Fine (2014), Trogon (2013) and Wilson (2014).

7. Sparse properties < abundant properties.⁷
8. The plurality of conjuncts < conjunctions.⁸
9. The law < a given act is illegal.⁹
10. The particle is acted on with net positive force < the particle accelerates.¹⁰
11. Simples < complexes.¹¹
12. Members < sets.¹²

It is worth noting a certain sloppiness in the presentation of these grounding claims. By the grammar of ground, categorical and dispositional features belong to the wrong sort of grammatical category to stand on either side of the grounding operator. It will be remembered that grounding is an operator holding between a set of sentences that expresses facts, and a sentence that expresses a fact. Categorical and dispositional features are neither sets of sentences nor sentences and therefore should not stand on either side of the grounding operator. Furthermore, once we have resolved this issue, we must also meet the demands of factivity. To reach grammatical precision therefore requires some tidying up. For example, we can tidy up ‘categorical features < dispositional features’ as ‘{an individual x has some categorical feature X } < x has some dispositional feature Y ’.

However, this example is not quite right, because potentially there are some categorical features that are not associated with any dispositional features. We do not want to rule out the possibility of an individual having some categorical feature and no dispositional features. Grounding necessitates - this means that:

$$\Delta \triangleleft \phi \rightarrow \Box(\wedge \Delta \rightarrow \phi).$$

Hence, if

$$\{x \text{ has some categorical feature } X\} \triangleleft x \text{ has some dispositional feature } Y,$$

then

$$\Box(x \text{ has some categorical feature } X \rightarrow x \text{ has some dispositional feature } Y).$$

⁷See Schaffer (2009a).

⁸See Fine (2014).

⁹See Daly (2014).

¹⁰See Fine (2014).

¹¹See Bliss & Trogon (2016).

¹²See Clark & Liggins (2012), Marshall (2013) and Schaffer (2009a).

This rules out the possibility of an individual having some categorical feature and no dispositional features. Something has gone wrong – it is the initial grounding claim that is at fault.

We can overcome this issue with more specific information. For example, grounding theorists want to say things like ‘{individual a possesses atomic composition XYZ } $\triangleleft a$ is fragile’. The lack of specificity in the list above is necessary to express the idea that any x ’s exemplification of any *specific* dispositional feature is grounded in x ’s exemplification of a *specific* categorical feature.

The rest of the list can be tidied up and made specific in analogous ways. I will call this giving an ‘instance’ of an ‘example schema’ taken from the list above. For example, ‘{specific simples a, b, \dots exist} \triangleleft specific complex c exists’ is an instance of the example schema ‘simples $<$ complexes’. Though some ingenuity may be required to give grammatical instances of these example schemes, it should be possible in each case.

I want these paradigmatic cases of grounding to be reflected in the Ground-Naturalness Connection. By this, I mean that each paradigmatic instance of grounding ‘ $\Delta \triangleleft \phi$ ’ should be such that ‘ $\Delta \triangleleft \phi$ ’ is $<$ -derivable from the set of natural grounding claims.

Where the Ground-Naturalness Connection fails to keep faith with these paradigmatic examples, this highlights at best a lacuna in my biconditionals. At worst, such failures suggest that nothing like the Ground-Naturalness Connection is true. On the other hand, where the Ground-Naturalness Connection is vindicated by these examples, I have offered evidence for the biconditional (in the left-to-right direction).

I start with some easier cases in §15.3 and §15.4, where it is relatively straightforward to show that these example schemes are vindicated by the Ground-Naturalness Connection. From there, I turn to the more complicated example schemes.

15.3 Example Schemes 1-6: Multiple Realisability

Example schemes 1-6 share the feature of multiple realisability. By this, I mean that the fact expressed by the grounded sentence can be realised in a multitude of ways. For example, a given dispositional feature can be realised by a

variety of categorical features. There are a wide range of physical compositions that give rise to fragility, such that fragility is multiply realisable by a variety of specific physical compositions. Similarly, that an act is wrong is multiply realisable: an act can be wrong in virtue of being a lie, or wrong in virtue of being vicious, and so on.

Analogous remarks can be made for cases 3-6. A normative feature can be realised by a variety of (combinations of) non-normative features: that an act is wrong can be realised by it being a lie, or being vicious, as in example schema 2. An aesthetic feature can be realised by a variety of (combinations of) non-aesthetic features: there are many beautiful things with different non-aesthetic features. A determinable can be realised by any one of its determinates: an object can be red by being scarlet, or by being crimson, and so on. Finally, a mental event can be realised by a variety of different physical events: the same person can feel hungry in virtue of being in a variety of physical states.

This is suggestive of the availability of appropriate perfectly natural translations. Suppose sentence ϕ is multiply realisable. A sentence expressing an individual realisation of ϕ is one disjunct of a (possibly infinite) disjunction of sentences expressing individual realisations. This disjunction expresses the exhaustive ways ϕ can be realised. If we translate this disjunction into Naturalish, then we have a perfectly natural translation of ϕ that can be appropriately manipulated with our deductive rules.

For example, consider the sentence ' a is fragile'. Each (Naturalish) sentence expressing an individual realisation of ' a is fragile' in terms of a 's categorical features XYZ_n forms a disjunct of a disjunction. This disjunction is a Naturalish translation of ' a is fragile':

$$\gamma: a \text{ has atomic composition } XYZ_1 \vee a \text{ has atomic composition } XYZ_2 \vee \dots$$

Each sentence expressing an individual realisation of a being fragile (translated into Naturalish) is a disjunct of γ . For example, suppose that a has atomic composition XYZ_1 . $\Lambda = 'a \text{ has atomic composition } XYZ_1'$ is a disjunct of γ . Note our rule that:

$$\frac{\text{for some } j \in I: \phi_j}{\{\phi_j\} < \bigvee_{i \in I} \phi_i}$$

Hence, we can use our deductive rules to derive that

$\Lambda \triangleleft \gamma$.

By Natural Grounding, ‘ $\{a \text{ has atomic composition } XYZ_1\} \blacktriangleleft a \text{ is fragile}$ ’. Consequently, the following can be trivially derived:

‘ $\{a \text{ has atomic composition } XYZ_1\} \triangleleft a \text{ is fragile}$ ’ is \triangleleft -derivable from the set of natural grounding claims.

By the Ground-Naturalness Connection, we reach the desired conclusion:

$\{a \text{ has atomic composition } XYZ_1\} \triangleleft a \text{ is fragile}$.¹³

The shared feature of multiple realisability means that analogous reasoning can be applied across example schemes 1-6. What is crucial is that each property referred to in the grounding sentences are more natural than any property referred to in the grounded sentence. This is so the Naturalish translation of the grounds is logically simpler than the Naturalish translation of what is grounded. Otherwise, the former could not be *disjuncts* of the latter disjunction.

Suppose that this relative naturalness condition is met. With these example schemes, it follows that appropriate perfectly natural translations are available

¹³I should note that sometimes we’ll have to appeal to our second disjunction rule, as given below:

$$\frac{\text{for each } i \in I: \Gamma, \phi_i < \psi}{\{\Gamma, \bigvee_{i \in I} \phi_i\} < \psi}$$

We’ll do this when the grounding fact is itself disjunctive. For example, suppose that a has atomic composition so-and-so, in virtue of which it is fragile. To have atomic composition so-and-so may itself be multiply realisable. For simplicity, let us assume that a natural translation of ‘ a has atomic composition so-and-so’ contains two disjuncts, and is given as follows:

$a \text{ has atomic composition } XYZ_1 \vee a \text{ has atomic composition } XYZ_2$

Consider again our natural translation γ of ‘ a is fragile’. By our first disjunction rule, we can use our rules to derive that $\{a \text{ has atomic composition } XYZ_1\} \triangleleft \gamma$ and that $\{a \text{ has atomic composition } XYZ_2\} \triangleleft \gamma$. We then use our second disjunction rule to derive that

(If a has atomic composition $XYZ_1 \vee a$ has atomic composition XYZ_2 , then) $\{a \text{ has atomic composition } XYZ_1 \vee a \text{ has atomic composition } XYZ_2\} < \gamma$.

Given that this is a non-reflexive example of weak ground, we can then derive the stronger claim that

$\{a \text{ has atomic composition } XYZ_1 \vee a \text{ has atomic composition } XYZ_2\} \triangleleft \gamma$,

as required. My thanks to Jon Litland and Michael Potter for raising this point, and making helpful suggestions for its resolution.

as (possibly infinite, translated into Naturalish) exhaustive disjunctions of potential realisations. With our deductive rules, we can then deduce that an individual realisation (translated into Naturalish) of what is being grounded in turn grounds this disjunction. By Natural Grounding, it follows that the desired grounding claim is a natural grounding claim. Consequently, by the Ground-Naturalness Connection, an individual realisation grounds what it is supposed to ground.

For the Naturalish translation of an individual realisation to be a disjunct of the Naturalish translation of the multiply realisable, grounded fact, it is necessary that the properties referred to on the left side of the grounding operator are more natural than the properties referred to on the right side. Moreover, because the (Naturalish translations of the) properties referred to on the left side are used to *define* the (Naturalish translation of the) property referred to on the right side, the former should be more *connectedly* natural than the latter. It is worth taking some time to explain what I mean by more *connectedly* natural.

Properties admit of perfectly natural definitions. It is built into the notion of naturalness that any property has a perfectly natural definition (see ch.6). In turn, these perfectly natural definitions are associated with multisets of the perfectly natural properties referred to in those perfectly natural definitions.¹⁴ Call these the ‘definitional toolbox multisets’ of perfectly natural definitions:

Definitional Toolbox Multiset Definition: Γ is the definitional toolbox multiset of perfectly natural definition γ iff $\forall x(x \text{ is a property referred to in } \gamma \leftrightarrow x \text{ is in } \Gamma \text{ as many times as it is referred to in } \gamma)$.

For example, suppose that the properties of being scarlet, being crimson ... were perfectly natural. Further suppose that a perfectly natural definition of the property of being red was ‘the property of being scarlet or being crimson or ...’ A definitional toolbox multiset corresponding to the property of being red would therefore be $\{\text{being scarlet, being crimson, ...}\}$.

Some definitional toolbox multisets are sub-multisets of other definitional toolbox multisets. Suppose that Γ is a definitional toolbox multiset correspond-

¹⁴See §11.4 for a brief introduction to the idea of multisets.

ing to property α , and that Δ is a definitional toolbox multiset corresponding to property β .¹⁵ We then say that:

Relative, Connected Naturalness Definition: α is more connectedly natural than β iff $\Gamma \subset \Delta$.

For example, suppose once more that the properties of being scarlet, being crimson ... were perfectly natural. A perfectly natural definition of the property of being scarlet is therefore ‘*being scarlet*’. Hence, a definitional toolbox multiset Γ of the property of being scarlet is $\{\textit{being scarlet}\}$. On the same suppositions, we found that a definitional toolbox multiset Δ of the property of being red is $\{\textit{being scarlet}, \textit{being crimson}, \dots\}$. We see that $\Gamma \subset \Delta$. Consequently, the property of being scarlet is more connectedly natural than the property of being red.

The idea behind relative, connected naturalness is that the perfectly natural definitions of some properties are *contained* in the perfectly natural definitions of others. From this, two observations follow. First, when α is more *connectedly* natural than β , α is more natural than β . This is because the complexity of α ’s perfectly natural definition is less than the complexity of β ’s perfectly natural definition: otherwise, the former definition could not be contained in the latter. Second, when α is more connectedly natural than β , the instantiation of α is metaphysically relevant to the instantiation of β . This is because part of the resources for β ’s instantiation is met by the instantiation of α .

Returning to example schemes 1-6, the thought is that the shared feature of multiple realisability supports the relation of relative, connected naturalness. For the sake of example, consider the claim that $\{a \text{ is scarlet}\} \triangleleft a \text{ is red}$ (a case of example schema 5). We have seen that determinables can be multiply realised by their determinates. ‘ $a \text{ is scarlet} \vee a \text{ is crimson} \vee \dots$ ’ is plausibly cointensional with ‘ $a \text{ is red}$ ’. Regardless of whether the appropriate, perfectly natural translations are available, it is nonetheless plausible that $\Box(a \text{ is scarlet} \vee a \text{ is crimson} \vee \dots \leftrightarrow a \text{ is red})$.

This means that determinables are fully *definable* out of their determinates. However, importantly, the converse does not hold. We cannot fully define determinates with their determinables alone. For example, we cannot fully

¹⁵A definitional toolbox multiset *corresponds* to a property α iff it is the definitional toolbox multiset of a perfectly natural definition of α .

characterise what it is for an individual a to be scarlet by saying that a is red – saying that a is red has failed to communicate all the information about the colour of a . This suggests that determinates are more connectedly natural than their determinables.

I took the case of ‘ $\{a \text{ is scarlet}\} \triangleleft a \text{ is red}$ ’ as an example. Yet the reasoning hinges only on this feature of multiple realisability, which is shared across example schemes 1-6. To take another example, we have seen that fragility can be defined out of a variety of atomic compositions: ‘ a has atomic composition $XYZ_1 \vee a$ has atomic composition $XYZ_2 \vee \dots$ ’ Meanwhile, having atomic composition XYZ_1 is not definable out of fragility. This means that the perfectly natural definition of fragility has greater definitional complexity than the perfectly natural definition of having atomic composition XYZ_1 . Hence, the latter is more natural than the former. Further, because of the definitional links between the two properties, the latter is more *connectedly* natural than the former. Because of the shared feature of multiple realisability across example schemes 1-6, analogous reasoning can be used to defend the idea that the properties referred to on the left side of the grounding operator are more connectedly natural than the properties referred to on the right side.

Some instances of these example schemes are not natural grounding claims, but will be \triangleleft -derivable from the set of natural grounding claims. Suppose that we have found that ‘ $\{a \text{ is scarlet}\} \blacktriangleleft a \text{ is red}$ ’. It follows that:

$$\{a \text{ is scarlet}\} \triangleleft (a \text{ is red} \vee a \text{ is green})'$$

Is \triangleleft -derivable from the set of natural grounding claims. This is because our deductive rules reflect the fact that obtaining disjuncts ground their disjunctions, and grounding is transitive.¹⁶ By the Ground-Naturalness Connection, it follows that:

$$\{a \text{ is scarlet}\} \triangleleft (a \text{ is red} \vee a \text{ is green}).$$

¹⁶The derivation is as follows. We know that the set of natural grounding claims contains the sentence that

(1) $\{a \text{ is scarlet}\} \triangleleft a \text{ is red}$.

As our deductive rules reflect that obtaining disjuncts ground their disjunctions, it is \triangleleft -derivable from this sentence that:

(2) $\{a \text{ is red}\} \triangleleft (a \text{ is red} \vee a \text{ is green})$.

Because grounding is transitive, it is \triangleleft -derivable that

(3) $\{a \text{ is scarlet}\} \triangleleft (a \text{ is red} \vee a \text{ is green})$.

Hence, it is \triangleleft -derivable from Γ that $\{a \text{ is scarlet}\} \triangleleft (a \text{ is red} \vee a \text{ is green})$.

We can therefore be confident that the Ground-Naturalness Connection is vindicated by example schemes 1-6.

It might be objected that it is unintuitive to deal with multiple realizability using disjunctions instead of quantifiers. The thought might be that the *metaphysical nature* of (for example) being red is the satisfaction of some conditions (perhaps regarding wavelengths and frequencies of light), rather than being one of an infinite number of particular shades of red.

I think this objection highlights an important point about Naturalish translation.¹⁷ As aforementioned, there is no presumption for unique Naturalish translation – a sentence may have numerous Naturalish translations. Further, a Naturalish translation of a predicate should not be seen as providing the *metaphysical essence* of the associated property. Though I have spoken of perfectly natural *definitions*, these definitions are not supposed to be *metaphysically significant* beyond our current purpose. It would be a further metaphysical posit that the essences of properties are given by some Naturalish translation of their predicates, and I do not make that posit here.

Hence, there might be some Naturalish translation of ‘*a* is red’ that uses existential quantification.¹⁸ This Naturalish translation may better reflect the essence of the property of being red. However, this does not mean that our disjunctive Naturalish translations are incorrect. I use infinitary, disjunctive Naturalish translations because they are tractable for our deductive rules.¹⁹ It may be that infinitary, disjunctive Naturalish translations fail to provide the metaphysical essence of determinable properties, but nor are they meant to.

¹⁷My thanks to Jon Litland and Michael Potter for identifying the need for this clarification.

¹⁸For example, consider the following symbolisation scheme:

- ‘*Bxyz*’: *x* is between *y* and *z*
- ‘*Wxy*’: *x* has wavelength *y*
- ‘*Fxy*’: *x* has frequency *y*

If these are Naturalish predicates (if they refer to properties that are perfectly natural), then the following might be a Naturalish translation of ‘*a* is red’:

$$\exists xy((Bxn_1n_2 \wedge Wax) \wedge Bym_1m_2 \wedge Fay))$$

when all red falls between wavelength n_1 and n_2 millimetres, and between frequency m_1 and m_2 hertz (limiting our attention to colours of light).

¹⁹It might be thought that we should simply provide deductive rules governing the behaviour of grounding and existential quantification. However, providing these rules is fraught with difficulty. For example, Korbmacher (2018) notes that there are significant infinitary complications from introducing quantification into infinitary ground logics. I leave such efforts for other projects.

15.4 Example Schemes 7 & 8: Some Easy Cases

Example schemes 7 and 8 are relatively straightforward. To see that the Ground-Naturalness Connection is vindicated by example schema 7, we must first make explicit the connection between naturalness and sparseness. I propose that the perfectly natural properties *just are* the sparse properties. The sparse properties are those that fully characterise the world without redundancy.²⁰ Other properties are redundant because they can be ‘defined out of’ the sparse properties. Similarly, relatively natural properties are defined out of the perfectly natural properties. The perfectly natural properties are primitive, in the sense that they are not definable out of other, more natural properties. They therefore form a minimal base of metaphysically privileged properties, just like the sparse properties. Furthermore, in introducing naturalness, Lewis (1983) seems to equate perfect naturalness and sparseness. Lewis notes that ‘like me, Bealer favours an inegalitarian twofold conception of properties: there are abundant ‘concepts’ and sparse ‘qualities’” (1983, 346, footnote 6). If Lewis does treat sparseness as distinct from naturalness, it is only in that *universals* are sparse whilst *properties* are natural. Given it is now commonplace to speak of sparse *properties*, this distinction falls away to nothing in the present context. Finally, the sparse properties are often identified as the properties of fundamental physics, just as the perfectly natural properties are.

The identification of the sparse properties with the perfectly natural properties shows that the Ground-Naturalness Connection keeps faith with example schema 7. The sparse properties are the perfectly natural properties, and

²⁰It may prove prudent to relax this redundancy constraint. My thanks to Jon Litland and Michael Potter for raising this point. The issue is that some relations are converses of one another, and thus interdefinable. This is problematic when such relations are apparently sparse. For example, Sider (2012) notes that the relations *earlier than* and *later than* are interdefinable, but appear sparse. We cannot say that one is sparse, and the other not, without arbitrariness. However, if there is to be no redundancy, then we cannot say that *both* are sparse. This forms a puzzle.

Sider suggests relaxing the redundancy constraint. We might say that the sparse properties fully characterise the world with *as little redundancy as avoiding arbitrariness allows*. An alternative approach is suggested by Dorr (2004), who argues that there are no non-symmetric relations (despite there being non-symmetric *predicates*). Fine (2000) argues for the weaker claim that certain relations (those with converses) cannot be said to hold in a specific order.

I propose that none of this undermines the Ground-Naturalness Connection, however. The puzzle for sparseness does not undermine an identification of the perfectly natural properties with the sparse properties. This is because the naturalness theorist faces an entirely analogous (indeed, in my view, *identical*) puzzle when faced with asymmetric relations that appear perfectly natural. This point of comparison provides further support for identifying the perfectly natural properties with the sparse properties.

abundant properties are the unnatural properties. Moreover, insofar as the instantiation of a sparse property *grounds* the instantiation of an abundant property, there should be some metaphysical connection between the sparse property and the abundant property. Suppose, for the sake of example, that the properties of being green, being round and being red were sparse, and that the property of being green and round is abundant. Though it is true that

$$\{a \text{ is green, } a \text{ is round}\} \triangleleft a \text{ is green and round,}$$

it is not the case that

$$\{a \text{ is red}\} \triangleleft a \text{ is green and round.}$$

This is despite (for the sake of this example) the property of being red being sparse and the property of being green and round being abundant. For an instance of example schema 7 to be true, there must *also* be a metaphysical connection between the sparse and the abundant property. What is required is that the sparse properties are used to *define* the abundant property.

My biconditional is therefore vindicated. Staying with the same example (and the same suppositions of which properties are sparse), a Naturalish translation of ‘*a* is green and round’ is ‘*a* is green \wedge *a* is round’.²¹ It is \triangleleft -derivable that

$$\{a \text{ is green, } a \text{ is round}\} \triangleleft a \text{ is green} \wedge a \text{ is round.}$$

This follows from the rule below:

$$\frac{\text{for each } i \in I: \phi_i}{\{\phi_i \mid i \in I\} \triangleleft \bigwedge_{i \in I} \phi_i}$$

By the Ground-Naturalness Connection, it therefore follows that:

$$\{a \text{ is green, } a \text{ is round}\} \triangleleft a \text{ is green and round.}$$

More generally, whenever the instantiation of sparse properties grounds the instantiation of an abundant property, it is because the abundant property is definable in terms of those sparse properties. This will be reflected in the Naturalish translations of the grounding sentence and the grounded sentence,

²¹Note that these two sentences are not equivalent. The first ascribes to *a* a ‘conjunctive’ *property*, whilst the other is a conjunction between two sentences about *a*.

such that it is $<$ -derivable that $\{\text{grounding sentence}\} \triangleleft \text{grounded sentence}$. By the Ground-Naturalness Connection, it follows that the instantiation of sparse properties grounds the instantiation of an abundant property.

Some instances of example schema 7 are not natural grounding claims. However, such instances will be $<$ -derivable from the set of natural grounding claims about sparse and abundant properties. For example:

It is $<$ -derivable from ‘ $\{a \text{ is green, } a \text{ is round}\} \triangleleft a \text{ is green and round}$ ’ that:
 $\{a \text{ is green, } a \text{ is round}\} \triangleleft (a \text{ is green and round} \vee a \text{ is red and cuboid})$.²²

Hence, the Ground-Naturalness Connection is also vindicated by these instances of example schema 7.

Example schema 8 states that conjuncts ground their conjunctions. Vindicating the Ground-Naturalness Connection for this example schema is relatively simple. This is because instantiations of example schema 8 are not natural grounding claims. In the case of conjuncts and conjunctions, it does not matter what claims comprise the set of natural grounding claims. This is because it is $<$ -derivable that obtaining conjuncts ground their conjunctions, as seen by the rule below:

$$\frac{\text{for each } i \in I: \phi_i}{\{\phi_i \mid i \in I\} < \bigwedge_{i \in I} \phi_i}$$

Consider a specific instantiation of example schema 8. Suppose we have sentences A and B . An instantiation of example schema 8 is that

$$\{A, B\} \triangleleft A \wedge B.$$

By the conjunction rule above, this claim is $<$ -derivable. Therefore, even if the set of natural grounding claims is empty, this sentence is $<$ -derivable from that set. By the Ground-Naturalness Connection, the sentence is a true grounding claim.

²²The derivation is as follows. Because our deductive rules reflect that obtaining disjuncts fully ground their disjunctions, it is $<$ -derivable that

(1) $\{a \text{ is green and round}\} \triangleleft (a \text{ is green and round} \vee a \text{ is red and cuboid})$.

We assume that

(2) $\{a \text{ is green, } a \text{ is round}\} \triangleleft a \text{ is green and round}$.

Because grounding is transitive, it is then $<$ -derivable that

(3) $\{a \text{ is green, } a \text{ is round}\} \triangleleft (a \text{ is green and round} \vee a \text{ is red and cuboid})$.

Consequently, we can conclude that

(4) it is $<$ -derivable from ‘ $\{a \text{ is green, } a \text{ is round}\} \triangleleft a \text{ is green and round}$ ’ that: $\{a \text{ is green, } a \text{ is round}\} \triangleleft (a \text{ is green and round} \vee a \text{ is red and cuboid})$.

15.5 Example Schema 9: Laws and Illegality

Example schema 9 holds that the law is so-and-so \triangleleft a given act is illegal. An instantiation of this schema is that $\{\text{the law is so-and-so}\} \triangleleft \text{murder is illegal}$.²³

However, I am doubtful that this grounding claim is true, because it seems to violate the non-monotonicity of grounding. To demonstrate this, consider the following toy example. Suppose that the law consisted of two prohibitions: that we are not allowed to murder and that we are not allowed to steal. We then ask ourselves whether the law being the way it is grounds that murder is illegal. Presumably it does not. That the law states that we are not allowed to murder *and* that we are not allowed to steal does not ground that murder is illegal, because the law's prohibition of stealing is irrelevant to the legal status of murder. The case is analogous to the grounding claim that $\{a \text{ is scarlet} \wedge a \text{ is round}\} \triangleleft a \text{ is red}$. Grounding theorists take this grounding claim to be false because the roundness of a is irrelevant to its redness.

The falsity of this example is reflected in the Ground-Naturalness Connection. Our deductive rules shouldn't allow us to violate grounding's non-monotonicity.

However, perhaps I have offered an unfair instantiation of example schema 9. Instead, an instance of example schema 9 might be that $\{\text{the law prohibits murder}\} \triangleleft \text{murder is illegal}$. This avoids violations of non-monotonicity. As it is, though, I still have doubts about whether the grounding claim is true. I suspect that 'the law prohibits murder' and 'murder is illegal' express the same fact. Given that grounding is irreflexive, it follows that it is not the case that $\{\text{the law prohibits murder}\} \triangleleft \text{murder is illegal}$.

If the grounding claim is false for these reasons, then any Naturalish translation of 'the law prohibits murder' is also a Naturalish translation of 'murder is illegal'. As we assume for our derivations that grounding is irreflexive, it follows by the Ground-Naturalness Connection that it is not the case that $\{\text{the law is so-and-so}\} \triangleleft \text{murder is illegal}$. Hence, the Ground-Naturalness Connection reflects the same issue.

I propose that these kinds of problem are quite general for example schema 9. Consider the claim that $\{\text{Roe v. Wade is law}\} \triangleleft \text{abortion rights are so-and-}$

²³It is probably not necessary to use ' \triangleleft ' rather than '<' here, given the law *is* so-and-so. However, I continue to use ' \triangleleft ' throughout this section, to allow the considered claims to have maximum generality. In any case, my use of ' \triangleleft ' rather than '<' does not impact on any of the arguments that follow in this section.

so'. With this claim we can form a dilemma. Either the so-and-so abortion rights *just are* those set out in Roe v. Wade, or they are not. If the so-and-so abortion rights just are those set out in Roe v. Wade, then 'abortion rights are so-and-so' and 'Roe v. Wade is law' seem to express the same fact. The grounding claim therefore appears to violate the irreflexivity of ground. This is reflected in the Ground-Naturalness Connection, because any Naturalish translation of 'abortion rights are so-and-so' is also a Naturalish translation of 'Roe v. Wade is law', and we assume for our derivations that grounding is irreflexive.

On the second horn of the dilemma, Roe v. Wade does not exhaust abortion rights being so-and-so, such that some aspects of abortion rights being so-and-so follow from laws distinct from Roe v. Wade. In this case, it is implausible that $\{\text{Roe v. Wade is law}\} \triangleleft \text{abortion rights are so-and-so}$. This is because grounds necessitate what they ground, and it is not the case that:

$$\Box(\text{Roe v. Wade is law} \rightarrow \text{abortion rights are so-and-so}).$$

What is more plausible is that $\{\text{Roe v. Wade is law}\} \trianglelefteq \text{abortion rights are so-and-so}$: that we have a *partial* grounding claim. Yet this partial grounding claim is not a special case related to laws and what is illegal. Instead, it is a straightforward case of a conjunct partially grounding its conjunction. Any Naturalish translation γ of 'abortion rights are so-and-so' is a conjunction given by a Naturalish translation Λ of 'Roe v. Wade is law' and a Naturalish translation of the rest of abortion rights. Λ therefore contains a conjunct of γ , such that ' $\Lambda \trianglelefteq \gamma$ ' is $<$ -derivable, and ' $\Lambda \triangleleft \gamma$ ' is not.

As this dilemma rests on claims about factual equivalence, it should be noted that it may be limited to the worldly conception of ground.²⁴ If we adopted a *conceptual* understanding of ground, we might insist that 'Roe v. Wade is law' and 'abortion rights are so-and-so' express different *truths*, even if they express the same *fact* (on the first horn's assumption that abortion rights are exhausted by Roe v. Wade). This would avoid issues of irreflexivity. However, I confess to finding the conceptual understanding of ground difficult. I'm not sure how to understand the claim (for example) that ' $\phi \vee \phi$ ' and ' ϕ ' express different truths. Given this conceptual impasse, I limit my arguments to the worldly conception of ground.

²⁴My thanks to Jon Litland and Michael Potter for raising this point.

Putting aside this qualification, we might consider a third instantiation of example schema 9 to try and avoid our dilemma. Consider the claim that {the Psychoactive Substances Act 2016 passed} \triangleleft it is illegal to import psychoactive substances. The thought behind the grounding claim is that the act of passing a law grounds the illegality of the actions that the law prohibits.

It is not clear that the Ground-Naturalness Connection meets this example, because it is not obvious that the passing of the Psychoactive Substances Act 2016 is more fundamental than the illegality of importing psychoactive substances. This means that we cannot guarantee the requisite, perfectly natural definitions for the Ground-Naturalness Connection to deliver a grounding claim. However, insofar as we doubt this direction of relative fundamentality, the grounding theorist is also merited to deny this grounding claim. This is because grounding is meant to track the direction of relative fundamentality between facts.²⁵

Suppose that the passing of the Psychoactive Substances Act 2016 *is* more fundamental than the illegality of importing psychoactive substances. This would then be reflected in the Ground-Naturalness Connection. We begin by treating the illegality of importing psychoactive substances as a multiply realisable fact. For example, it could be realised by the passing of the Psychoactive Substances Act 2016, or it could be realised by the passing of some other law at some other time. This means that a Naturalish translation of ‘it is illegal to import psychoactive substances’ is a Naturalish translation of ‘the Psychoactive Substances Act 2016 is passed \vee law₁ is passed \vee law₂ is passed ...’ Hence, the Naturalish translation of ‘the Psychoactive Substances Act 2016 is passed’ is a disjunct of a Naturalish translation of ‘it is illegal to import psychoactive substances’. Our deductive rules reflect that obtaining disjuncts ground their disjunctions. Hence, the Ground-Naturalness Connection delivers that {the Psychoactive Substances Act 2016 is passed} \triangleleft it is illegal to import psychoactive substances, as desired.

As noted, I am doubtful of this grounding claim, because I doubt that the Naturalish translation of the disjunction offered *is* a perfectly natural definition of ‘it is illegal to import psychoactive substances’. This is because I doubt

²⁵Moreover, we have the familiar problem of violating non-monotonicity. As the Psychoactive Substances Act 2016 also makes it illegal to *export* psychoactive substances, and so on, it is not clear that all of the grounding fact is metaphysically relevant to the grounded fact.

that ‘the Psychoactive Substances Act 2016 is passed’ is more fundamental than ‘it is illegal to import psychoactive substances’. I propose that this claim has mistaken causation for grounding. It is plausible that the passing of the Psychoactive Substances Act 2016 *caused* it to be illegal to import psychoactive substances. This shows that not every causal claim is a grounding claim, because causes are not always more fundamental than their effects.

As noted, if the grounding theorist shares these concerns, they are also merited to deny the grounding claim as given. We therefore see that reasonable doubts about the truth of a grounding claim are reflected in the Ground-Naturalness Connection. Hence, the Ground-Naturalness Connection vindicates successful grounding claims.

In this instance, the Ground-Naturalness Connection also offers a diagnostic of controversial grounding claims. With each example of schema 9 considered, we were able to pinpoint the precise worries we had with that grounding claim. This was aided by thinking of grounding through the Ground-Naturalness Connection. For example, we were able to identify worries regarding violations of non-monotonicity, as well as worries regarding the direction of relative fundamentality. By identifying these concerns, the Ground-Naturalness Connection enjoys a theoretical benefit in helping to make precise those arguments that surround such grounding claims.

15.6 Example Schema 10: A Puzzle for Ground

An example of example schema 10 is that a particle is acted on with net positive force \triangleleft the particle accelerates. I find this example interesting because it seems to generate a puzzle for grounding theorists.

Grounding connects facts. This means that the truth of a grounding claim should not depend on how those facts are expressed. When the sentences in Δ and Λ express the same facts, $\Delta \triangleleft \phi$ iff $\Lambda \triangleleft \phi$. Similarly, when ϕ and γ express the same fact, $\Delta \triangleleft \phi$ iff $\Delta \triangleleft \gamma$.

The case is analogous for partial grounding. When the sentences in Δ and Λ express the same facts, $\Delta \leq \phi$ iff $\Lambda \leq \phi$. When ϕ and γ express the same fact, $\Delta \leq \phi$ iff $\Delta \leq \gamma$.

This can be problematic, as the following example shows. Suppose that

individual a is accelerating at 2m/s^2 .²⁶ Because acceleration = net force \div mass, we can express this fact in (at least) two ways:

1. ϕ : a is accelerating at 2m/s^2 .
2. γ : $((a \text{ has a net force of } 2\text{N acting on it} \wedge a \text{ has a mass of } 1\text{kg}) \vee (a \text{ has a net force of } 3\text{N acting on it} \wedge a \text{ has a mass of } 1.5\text{kg}) \vee \dots)$

γ is an infinitely long sentence and is non-ideal for many practical reasons when compared with ϕ , but it nonetheless expresses the same fact.

Similarly, we can express the fact that a has a net force of 2N acting on it in (at least) two ways:

1. Δ : $\{a \text{ has a net force of } 2\text{N acting on it.}\}$
2. Λ : $\{((a \text{ is accelerating at } 2\text{m/s}^2 \wedge a \text{ has a mass of } 1\text{kg}) \vee (a \text{ is accelerating at } 4\text{m/s}^2 \wedge a \text{ has a mass of } 0.5\text{kg}) \vee \dots)\}$

Again, Λ is infinitely long and generally unwieldy, but its sentence still expresses the same fact as the sentence in Δ , regardless of these shortcomings.

From this we can construct the following puzzle.

$\Delta \trianglelefteq \gamma$. This is because there is some Σ such that $\Delta \cup \Sigma \triangleleft \gamma$, namely when $\Sigma = \{a \text{ has a mass of } 1\text{kg}\}$:

$$\Delta \cup \{a \text{ has a mass of } 1\text{kg}\} \triangleleft (a \text{ has a net force of } 2\text{N acting on it} \wedge a \text{ has a mass of } 1\text{kg})$$

Consequently, $\Delta \cup \Sigma \triangleleft$ a disjunct of γ . As obtaining disjuncts ground their disjunctions, and grounding is transitive, it follows that $\Delta \cup \Sigma \triangleleft \gamma$. From the definition of partial ground, it follows that $\Delta \trianglelefteq \gamma$.

As $\Delta \trianglelefteq \gamma$, it follows that $\Delta \trianglelefteq \phi$. This is because γ and ϕ express the same fact.

Meanwhile, $\{\phi\} \trianglelefteq \Lambda$.²⁷ This is because there is some Σ such that $\{\phi\} \cup \Sigma \triangleleft \Lambda$, namely when $\Sigma = \{a \text{ has a mass of } 1\text{kg}\}$:

²⁶As we make this supposition, it is not necessary for me to use ' \triangleleft ' rather than ' $<$ ' in what follows. However, I continue to use ' \triangleleft ' for consistency with earlier sections. In any case, this does not affect any of the arguments in this section.

²⁷This is not quite grammatical, because Λ is a set rather than a sentence. To make the claim grammatical, we can write it as ' $\{\phi\} \trianglelefteq$ the sentence in Λ '. As it is, I leave the claim as it is: though it is ungrammatical, its current presentation aids readability. Readers who prefer strict adherence to grammar can take ' $\{\phi\} \trianglelefteq \Lambda$ ' to be an abbreviation of ' $\{\phi\} \trianglelefteq$ the sentence in Λ ', and analogously for other such, ungrammatical claims.

$\{\phi, a \text{ has a mass of } 1\text{kg}\} \triangleleft (a \text{ is accelerating at } 2\text{m/s}^2 \wedge a \text{ has a mass of } 1\text{kg})$

Consequently, $\{\phi\} \cup \Sigma \triangleleft$ a disjunct of Λ . As obtaining disjuncts ground their disjunctions, and grounding is transitive, it follows that $\{\phi\} \cup \Sigma \triangleleft \Lambda$. From the definition of partial ground, it follows that $\{\phi\} \trianglelefteq \Lambda$.

As $\{\phi\} \trianglelefteq \Lambda$, it follows that $\{\phi\} \trianglelefteq \Delta$. This is because the sentences in Λ and Δ express the same fact.

Hence, both $\{\Delta\} \trianglelefteq \phi$ and $\{\phi\} \trianglelefteq \Delta$. This violates the asymmetry of (partial) grounding, leaving us in a puzzle.

It is not clear how to escape. We might reject the claim that the truth of a grounding claim does not depend on how those facts are expressed. However, this means that grounding becomes relative to the language of discourse. This undermines the supposed objectivity of ground.

We might reject that ϕ and γ express the same fact, or that the sentences in Δ and Λ express the same fact. However, given the Newtonian equation of $F = ma$, it is not clear to me how this could be justified.

Alternatively, we might reject the asymmetry of partial grounding. This means that partial grounding only imperfectly tracks the direction of relative fundamentality, such that partial grounds can be as fundamental as what they partially ground. Given an analogous puzzle can be mustered for full ground, we also must abandon the asymmetry of full ground.

Consider again the option of treating grounding as language-relative. Grounding theorists can preserve the objectivity of ground by fixing a privileged language of ground. An obvious choice would be Naturalish. Suppose that there is no predicate in Naturalish referring to the property of accelerating at $x\text{m/s}^2$. The thought is that the properties of being acted on with a net force of $y\text{N}$, and of having a mass of $z\text{kg}$, are perfectly natural whilst the property of accelerating at $x\text{m/s}^2$ is not. This means that ϕ and the sentence in Λ are not sentences in Naturalish. We get that $\Delta \trianglelefteq \gamma$, but we cannot reverse the direction of grounding, because grounding is relative to Naturalish. Meanwhile, grounding remains objective because Naturalish is, supposedly, objectively privileged.

This manoeuvre plays directly into the vindication of the Ground-Naturalness Connection. Suppose we are considering the claim that

$\{a \text{ has a net force of } 2\text{N acting on it, } a \text{ has a mass of } 1\text{kg}\} \triangleleft a \text{ is accelerating at } 2\text{m/s}^2$.

The grounding theorist has supposed that a perfectly natural translation of ‘ a is accelerating at 2m/s^2 ’ is γ . Meanwhile, ‘ a has a net force of 2N acting on it, a has a mass of 1kg ’ are perfectly natural translations of themselves. It is \triangleleft -derivable that

$\{a \text{ has a net force of } 2\text{N acting on it, } a \text{ has a mass of } 1\text{kg}\} \triangleleft \gamma$.

By Natural Grounding and the Ground-Naturalness Connection, we can derive the desired conclusion that

$\{a \text{ has a net force of } 2\text{N acting on it, } a \text{ has a mass of } 1\text{kg}\} \triangleleft a \text{ is accelerating at } 2\text{m/s}^2$.²⁸

The appeal to Naturalish solves the issue and vindicates the Ground-Naturalness Connection. However, the manoeuvre relies on the assumption that the property of accelerating at $x\text{m/s}^2$ is not perfectly natural (or the properties of being acted on with a net force of $y\text{N}$, or of having a mass of $z\text{kg}$, are not perfectly natural). Suppose that all three properties are perfectly natural. It follows that ϕ , γ , the sentence in Δ and the sentence in Λ are all sentences in Naturalish, allowing the puzzle to proceed as before.

In this instance, the grounding theorist might abandon the asymmetry of ground. The Ground-Naturalness Connection would reflect this abandonment (once we abandoned the asymmetry of ground and associated derivations). If all three properties are perfectly natural, then γ is a perfectly natural translation of ϕ , and it is \triangleleft -derivable that

$\Delta \cup \{a \text{ has a mass of } 1\text{kg}\} \triangleleft \gamma$.

Hence, by Natural Grounding and the Ground-Naturalness Connection:

²⁸This derivation is as follows. It is \triangleleft -derivable that

(1) $\{a \text{ has a net force of } 2\text{N acting on it, } a \text{ has a mass of } 1\text{kg}\} \triangleleft \gamma$.

By Natural Grounding, it follows that

(2) $\{a \text{ has a net force of } 2\text{N acting on it, } a \text{ has a mass of } 1\text{kg}\} \triangleleft a \text{ is accelerating at } 2\text{m/s}^2$

By the Ground-Naturalness Connection, it follows that

(3) $\{a \text{ has a net force of } 2\text{N acting on it, } a \text{ has a mass of } 1\text{kg}\} \triangleleft a \text{ is accelerating at } 2\text{m/s}^2$, as desired.

$\{a \text{ has a net force of } 2\text{N acting on it, } a \text{ has a mass of } 1\text{kg}\} \triangleleft a \text{ is accelerating at } 2\text{m/s}^2$.²⁹

Meanwhile, if all three properties are perfectly natural, then the sentence in Λ is a perfectly natural translation of the sentence in Δ . From this, it is \triangleleft -derivable that

$\{\phi, a \text{ has a mass of } 1\text{kg}\} \triangleleft \Lambda$.

Hence, by Natural Grounding and the Ground-Naturalness Connection:

$\{a \text{ is accelerating at } 2\text{m/s}^2, a \text{ has a mass of } 1\text{kg}\} \triangleleft a \text{ has a net force of } 2\text{N acting on it}$.³⁰

Hence, the Ground-Naturalness Connection delivers a symmetric instance of ground, on the assumption that all three properties are perfectly natural.

The substantivist might make the following objection:

The connection between force, mass and acceleration is contingent: the laws of nature might have been different. Hence, a Naturalish translation of ‘ a is accelerating at 2m/s^2 ’ should not mention ‘force’ or ‘mass’ – at some worlds, acceleration has nothing to do with such properties.

This is an interesting objection, and it is worth considering its impact.³¹ As we have noted, grounding necessitates. Hence, if the grounding claim

$\{a \text{ has a net force of } 2\text{N acting on it, } a \text{ has a mass of } 1\text{kg}\} \triangleleft a \text{ is accelerating at } 2\text{m/s}^2$

is true, then

$\Box((a \text{ has a net force of } 2\text{N acting on it} \wedge a \text{ has a mass of } 1\text{kg}) \rightarrow a \text{ is accelerating at } 2\text{m/s}^2)$

²⁹See footnote 16 for the full details of an analogous derivation.

³⁰Again, see footnote 16 for the full details of an analogous derivation.

³¹My thanks to Jon Litland and Michael Potter for raising it.

My opponent denies this modal claim, and so denies the truth of the grounding claim. Hence, their response to this puzzle is to deny the grounding claims that led to them. Moreover, it should be noted that Ground-Naturalness Connection tracks their concerns. My opponent denies that there is a necessary connection between force, mass and acceleration. This is tracked in the Ground-Naturalness Connection by the unavailability of appropriate Naturalish translations. If my opponent is correct, there are no Naturalish translations of sentences involving acceleration that mention ‘force’ and ‘mass’. Once again, the Ground-Naturalness Connection offers a useful diagnosis of the grounding claim, because it makes explicit why some philosophers may want to deny these grounding claims.

On the other hand, I contend that my opponent’s objection is controversial. We might respond that what we call ‘acceleration’ at a possible world where $F \neq ma$ is not genuinely acceleration, but some other phenomenon: call it ‘schmacceleration’. This makes explicit the thought that acceleration is *defined* in terms of Newton’s equation, and pushes back on the idea that the connection between acceleration, force and mass is contingent.

Such an argument makes a case for a *metaphysically* necessary connection between acceleration, force and mass. However, suppose that my opponent had reason to deny this argument. Perhaps she would concede, nonetheless, that there is *some* notion of necessity at play. Fine (2005) contends that there are natural necessitites, such that natural necessity is not merely a restriction or defined in terms of metaphysical necessity. Fine argues that ‘natural necessity is the form of necessity that pertains to natural phenomena’ (2005, 238). He gives the example of one billiard-ball hitting another, arguing that there is a sense (given certain antecedent conditions) in which the second ball *must* move. This is not a metaphysical necessity, but a physical one.

Fine (2014) then makes a case for a limited pluralism of ground, corresponding to different notions of necessity. Hence, he suggests that there is a notion of metaphysical ground and a distinct notion of natural ground. If my opponent is happy to follow Fine along these lines, then their objection serves only to restrict the puzzle to natural grounding. This should be considered progress by my opponent, but they must still contend with this apparent, symmetric instance of natural grounding.

If we resist Fine and argue that natural grounding is merely a restriction

of metaphysical grounding, then another response to my opponent is available. We accept that

$\{a \text{ has a net force of 2N acting on it, } a \text{ has a mass of 1kg}\} \triangleleft a \text{ is accelerating at } 2\text{m/s}^2$

is not a true grounding claim, but instead argue that

$\{F = ma, a \text{ has a net force of 2N acting on it, } a \text{ has a mass of 1kg}\} \triangleleft a \text{ is accelerating at } 2\text{m/s}^2$

is a true grounding claim. The puzzle can then proceed analogously. From the perspective of the Ground-Naturalness Connection, we contend that

$(F = ma \wedge ((a \text{ has a net force of 2N acting on it} \wedge a \text{ has a mass of 1kg}) \vee (a \text{ has a net force of 3N acting on it} \wedge a \text{ has a mass of 1.5kg}) \vee \dots))$

is a Naturalish translation of ‘ a is accelerating at 2m/s^2 ’ when acceleration, force and mass all correspond to perfectly natural properties. The Ground-Naturalness Connection therefore continues to track our reasoning about grounding.

With this in mind, it is not obvious to me what to say about this puzzle. I do not see why Newton’s equation or anything in physics suggests that acceleration is less fundamental than force or mass, but the alternative requires abandoning the asymmetry of ground. In either case, the Ground-Naturalness Connection reflects the choice of the grounding theorist. If the grounding theorist thinks that acceleration is not fundamental, then (because naturalness tracks the relative fundamentality of properties) it follows that the property of accelerating at $x\text{m/s}^2$ is not perfectly natural. As noted above, on these assumptions, the Ground-Naturalness Connection delivers the claim that

$\{a \text{ has a net force of 2N acting on it, } a \text{ has a mass of 1kg}\} \triangleleft a \text{ is accelerating at } 2\text{m/s}^2$.

Alternatively, if the grounding theorist thinks that acceleration is equally fundamental to mass and net force (such that the three properties are all perfectly natural), the puzzle reasserts itself and it seems they must abandon the asymmetry of ground. Reflecting this, the Ground-Naturalness Connection delivers the desired twin claims:

$\{a \text{ has a net force of } 2\text{N acting on it, } a \text{ has a mass of } 1\text{kg}\} \triangleleft a \text{ is accelerating at } 2\text{m/s}^2$

$\{a \text{ is accelerating at } 2\text{m/s}^2, a \text{ has a mass of } 1\text{kg}\} \triangleleft a \text{ has a net force of } 2\text{N acting on it.}$

Either way, then, the Ground-Naturalness Connection tracks the reasoning of grounding theorists, as desired.

Once again, the Ground-Naturalness Connection also enjoys a theoretical benefit in offering a diagnostic of this puzzle. By thinking of grounding in terms of my biconditional, I was able to highlight the precise problem. In this case, the issue regards matters of relative fundamentality, and whether acceleration is less fundamental than force or mass. This demonstrates the Ground-Naturalness Connection's utility in highlighting what is at issue in puzzles of ground.

15.7 Example Schema 11: Simplex, Complexes and Existence

The example schema states that simplex < complexes. Of course, for an instance of this example scheme to be true, the simplexes must be those that exhaustively *make up* the complex. Moreover, what is grounded is the *existence* of the complex. A grammatical instance of example schema 11 reflects these points.

Consequently, consider the following instance of the example schema. Suppose that a and b are simplexes and that c is the complex formed by the mereological sum of a and b . For sake of simplicity, I adopt the maximalist assumption that any sum of simplexes forms a complex.

From there, the grounding claim is that

$$\{\exists x(x = a), \exists x(x = b)\} \triangleleft \exists x(x = c),$$

when existence is expressed through the existential quantifier.³²

$\gamma = \text{'}\exists x(x = a) \wedge \exists x(x = b)\text{'}$ is trivially a Naturalish translation of $\text{'}\exists x(x = c)\text{'}$. This is because γ and $\text{'}\exists x(x = c)\text{'}$ are cointensional, and neither sentence refers to any properties.³³

³²Such that the claim can be glossed as 'if a , b exist, then the fact that a , b exists grounds that c exists'.

³³Similarly, $\text{'}\exists x(x = c)\text{'}$ is a Naturalish translation of γ .

Our deductive rules reflect that conjuncts ground their conjunctions. We can therefore use them to derive that

$$\{\exists x(x = a), \exists x(x = b)\} \triangleleft \gamma$$

Meanwhile, the sentences ' $\exists x(x = a)$ ' and ' $\exists x(x = b)$ ' are trivially Naturalish translations of themselves. This is trivially the case because neither sentence refers to any properties. ' $\{\exists x(x = a), \exists x(x = b)\} \blacktriangleleft \gamma$ '. By the Ground-Naturalness Connection, it follows that

$$\{\exists x(x = a), \exists x(x = b)\} \triangleleft \exists x(x = c).$$

This reasoning reaches the desired result in this case, but it is problematic in other cases. Suppose that a , b and c all necessarily exist. It follows that a Naturalish translation of ' $\exists x(x = a)$ ' is ' $\exists x(x = b) \wedge \exists x(x = c)$ '. From there, analogous reasoning has the Ground-Naturalness Connection deliver the claim that

$$\{\exists x(x = b), \exists x(x = c)\} \triangleleft \exists x(x = a).$$

This result violates the asymmetry of ground. Moreover, the second grounding claim is intuitively implausible: the existence of complexes does not ground the existence of their simples. Further, because both ' $\exists x(x = b)$ ' and ' $\exists x(x = b) \wedge \exists x(x = c)$ ' are Naturalish translation of ' $\exists x(x = a)$ ', it follows from the Ground-Naturalness connection that:

$$\{\exists x(x = a)\} \triangleleft \exists x(x = a)$$

This result violates the irreflexivity of ground.

We might be tempted in this case to appeal to haecceitic properties: properties uniquely exemplified by specific individuals. Haecceitic properties are used by Quine to 'subsume a one-word name or alleged name ... under Russell's theory of description' (1948, 27). For example, we might 'convert' the names ' a ', ' b ' and ' c ' into the properties of *being a*, *being b* and *being c*. I refer to these properties by predicates ' A ', ' B ' and ' C ', respectively. We might then insist that the Naturalish translation of 'complex c exists' is

$$\exists xAx \wedge \exists xBx$$

and the Naturalish translations of ‘simple a exists’ and ‘simple b exists’ are ‘ $\exists xAx$ ’ and ‘ $\exists xBx$ ’, respectively. From there, we note that our deductive rules reflect that conjuncts (collectively) ground their conjunctions. We can therefore derive that

$$\{\exists xAx, \exists xBx\} \triangleleft \exists xAx \wedge \exists xBx.$$

It follows that the grounds have a Naturalish translation Λ , and the grounded has a Naturalish translation γ , such that it is \triangleleft -derivable that $\Lambda \triangleleft \gamma$. ‘ $\{\exists x(x = a), \exists x(x = b)\} \blacktriangleleft \exists x(x = c)$ ’. By the Ground-Naturalness Connection, it follows that

$$\{\exists x(x = a), \exists x(x = b)\} \triangleleft \exists x(x = c),$$

as desired. Furthermore, because the property referred to by ‘ C ’ is not perfectly natural, we cannot reverse the direction of grounding when referring to these haecceitic properties. ‘ $\exists xCx$ ’ cannot be the Naturalish translation of ‘simple a exists’, because the predicate ‘ C ’ is not a Naturalish predicate.

Though this approach provides the correct direction of grounding, it does not entirely solve our issue. This is because it does not do anything to *rule out* the problematic Naturalish translations given earlier. The new approach provides some unproblematic Naturalish translations, but this is compatible with the existence of distinct, problematic Naturalish translations of the same English sentences.³⁴ Hence, though ‘ $\exists xAx$ ’ is a Naturalish translation of ‘simple a exists’, so is ‘ $\exists x(x = b) \wedge \exists x(x = c)$ ’ (assuming that a , b and c all necessarily exist). Hence, appealing to haecceitic properties does nothing to block the problematic, symmetric result we have considered earlier in this section.

The solution is to stipulate that Naturalish does not contain any names.³⁵ Having stipulated that there are no names in Naturalish, it follows that ‘ $\exists x(x = b) \wedge \exists x(x = c)$ ’ is not a Naturalish translation of ‘simple a exists’. This is because the names ‘ b ’ and ‘ c ’ are not included in Naturalish. Having removed all names from Naturalish, we must instead appeal to haecceitic properties when providing the Naturalish translation of ‘simple a exists’. The situation is then as detailed above.

³⁴Remember that English sentences can have numerous Naturalish translations.

³⁵Note that such a stipulation does not threaten the deflationary-friendliness of the Ground-Naturalness Connection. It remains deflationary-friendly whether a property is perfectly natural, and hence whether its corresponding predicate is a Naturalish predicate.

Some philosophers may balk at the idea of simples a , b being more fundamental than complex c . They would therefore reject the claim that the properties referred to by ‘ A ’ and ‘ B ’ are more natural than the property referred to by ‘ C ’, such that they reject the claim that ‘ $\exists xAx \wedge \exists xBx$ ’ is a Naturalish translation of ‘ $\exists x(x = c)$ ’. However, I propose that such philosophers are also well-motivated to reject the claim that

$$\{\exists x(x = a), \exists x(x = b)\} \triangleleft \exists x(x = c).$$

I cannot think of a motivation to think that the existence of particular simples grounds the existence of their complexes other than through the idea that particular simples are in some sense more fundamental than their complexes. Remember that grounding is meant to track the direction of relative fundamentality. We therefore see parallels between grounding judgements and judgements of relative, connected naturalness, supporting the Ground-Naturalness Connection.³⁶ Furthermore, thinking of grounding through the Ground-Naturalness Connection highlights the precise assumptions underpinning the grounding claim: that particular simples are more fundamental than their complexes. Once more, the Ground-Naturalness Connection offers a helpful diagnostic behind grounding claims.

Removing names from Naturalish complicates other Naturalish translations, but does not threaten the previous results of this chapter. For example, suppose (for sake of simplicity) that properties corresponding to shades of red are perfectly natural, and the property of being red is not perfectly natural. Previously, I have suggested that a Naturalish translation of ‘ a is red’ is (on these suppositions)

$$a \text{ is scarlet} \vee a \text{ is crimson} \vee \dots$$

This Naturalish translation is incorrect when there are no names in Naturalish, because we can no longer help ourselves to the name ‘ a ’. However, we could offer the following Naturalish translation instead:

$$\gamma: \exists x(Ax \wedge x \text{ is scarlet}) \vee \exists x(Ax \wedge x \text{ is crimson}) \vee \dots,$$

³⁶Note that even if a , b and c all necessarily exist, this does not mean that there is a predicate for *being c* in Naturalish. We would still need predicates for *being a* and *being b* to distinguish individuals a and b – ‘*being c*’ could not be used to express distinctions between them. Meanwhile, if we have names for a and b , then a name for c is redundant.

when the property referred to by ‘ A ’ is the property of being a .

As noted, this makes our Naturalish translations more complicated, but does not throw into doubt the result that ‘ $\{a \text{ is scarlet}\} \triangleleft a \text{ is red}$ ’. This is because our Naturalish translation of ‘ $a \text{ is scarlet}$ ’ becomes

$$\Lambda: \exists x(Ax \wedge x \text{ is scarlet})$$

$\Lambda \triangleleft \gamma$ is $<$ -derivable, because our deductive rules reflect that obtaining disjuncts ground their disjunctions. By the Ground-Naturalness Connection, it follows that

$$\{a \text{ is scarlet}\} \triangleleft a \text{ is red},$$

as desired.³⁷

15.8 Example Schema 12: Set-Theoretic Grounding

There are limitations in our deductive rules. Our deductive rules cannot handle quantification, modal notions and so on. This causes issues when we consider example schema 12.

Example schema 12 states that members $<$ sets. A grammatically tidied instantiation is something like the following: $\{\text{Socrates exists}\} \triangleleft \{\text{Socrates}\}$ exists. Note that the left-hand-side of the grounding operator is a singleton set containing a *sentence*, whilst the right-hand-side of the grounding operator is a sentence referring to the singleton set containing *Socrates*.

To handle sets, we might supplement our deductive rules with the following deduction rule, *Membership Grounding*:

$$\frac{\wedge\{\exists x(x = \phi_i) \mid i \in I\}}{\wedge\{\exists x(x = \phi_i) \mid i \in I\} < \exists y(y = \{\phi_i \mid i \in I\})}$$

³⁷It should be noted that there is some art in finding tractable Naturalish translations – my thanks to Jon Litland and Michael Potter for raising this point. For example, I might have offered the following Naturalish translation of ‘ $a \text{ is red}$ ’:

$$\exists x((Ax \wedge x \text{ is scarlet}) \vee (Ax \wedge x \text{ is crimson}) \vee \dots)$$

This Naturalish translation is not tractable with our deductive rules, as we would need rules for the grounding behaviour of disjunctions *within* the scope of quantification.

As has been noted, there is no presumption for unique Naturalish translation. Our definition of natural grounding only requires that *some* Naturalish translations Λ , γ of Δ and ϕ are such ‘ $\Lambda \triangleleft \gamma$ ’ is $<$ -derivable. Hence, the availability of intractable Naturalish translations does not undermine the Ground-Naturalness Connection – there is only a problem of tractable Naturalish translations are *not* available.

Suppose that $\{\phi_i \mid i \in I\} = \{\text{Socrates}\}$, such that $\bigwedge\{\exists x(x = \phi_i) \mid i \in I\}$ is equivalent to ' $\exists x(x = \text{Socrates})$ '. When our rules are supplemented with Membership Grounding, it is \prec -derivable that

$$\{\exists x(x = \text{Socrates})\} \prec \exists y(y = \{\text{Socrates}\}).$$

By the Ground-Naturalness Connection, and by treating existential quantification as expressing existence, it follows that $\{\text{Socrates exists}\} \prec \{\text{Socrates}\}$ exists, as desired.³⁸

It might be objected that supplementing our deductive rules is something like a cheat. The worry is that we could simply add a deductive rule for each, true grounding claim. Less dramatically, we may need to keep adding deductive rules to deal with how different types of entities are grounded: such as multi-sets, sequences, hylomorphic compounds and so on.³⁹ Regardless, the worry is that, with each supplemental rule, we cheapen the importance of the Ground-Naturalness Connection, and the role played by Naturalish translation.

I think this is a genuine concern. However, it is worth stating a few points in defence of the Ground-Naturalness Connection and my deflationary-friendly purpose.

Firstly, we can resist the thought that adding supplemental rules to govern the grounding behaviour of different types of entities is unduly *ad hoc*. This is because the grounding theorist would presumably endorse the supplemental deductive rules that would be offered. For example, grounding theorists are presumably content to say that Membership Grounding holds with generality, and can be properly thought of as a deductive rule reflecting the nature of grounding. Though we may have to add many more rules governing the grounding behaviour of further kinds of entities, the thought is that each additional rule would be endorsed by the typical grounding theorist. Further, it should be remembered that the Ground-Naturalness Connection is not offered as an *analysis* of grounding. Increased complexity from an increasing number of deductive rules may undermine the Ground-Naturalness Connection as an analysis of grounding, but presumably does not impact upon the truth of the biconditional itself.

³⁸The derivation is as follows. It is \prec -derivable by Membership Grounding that $\{\exists x(x = \text{Socrates})\} \prec \exists y(y = \{\text{Socrates}\})$. Hence, this sentence is \prec -derivable from the set of natural grounding claims. Hence, by the Ground-Naturalness Connection, it is a true grounding claim.

³⁹My thanks to Jon Litland and Michael Potter for raising this concern.

Secondly, it is worth remembering my deflationary-friendly project. Each time we add a supplemental, deductive rule, we risk our deflationary-friendly interpretation (see §13.5) of those deductive rules. We would have to check that each rule can be interpreted as reflecting the nature of a certain kind of explanation: one from the logically simple to the logically complex. For example, I would contend that Membership Grounding can be interpreted this way (with a sufficiently broad understanding of what is logical). The thought is that we explain the existence of sets – logically complex entities – by the existence of their members.⁴⁰ This imposes a check on the kind of supplemental rules that could be added, and maintains the overall deflationary-friendly purpose of this thesis.

Nonetheless, adding supplemental rules that are not mediated through Naturalish translation does undermine the role played by Naturalish translation in the Ground-Naturalness Connection. This might motivate us to adopt a third defence. We might be optimistic for the formulation of some deductive rule governing the grounding behaviour of abstraction more generally. If we had such a rule, we would only need a single supplemental rule rather than many, thus limiting the impact on the Ground-Naturalness Connection.

The thought may run as follows.⁴¹ In set-theory and other abstraction-theories, we have principles such as ‘if you have such-and-such things, then you have an object so-and-so’. The situation is made more complex by the need to protect the consistency of the theory. For example, there are limitations on the construction of sets to avoid the set-theoretic paradoxes. Hence, each abstraction-theory may have some mathematical principle of the following shape:

For any things $a_1, a_2 \dots$ such that $\Phi(a_1, a_2 \dots)$, ABSTRACTION($a_1, a_2 \dots$) exists,

when ‘ $\Phi(\dots)$ ’ outlines some condition designed to make our abstraction-theory consistent, and ‘ABSTRACTION(\dots)’ is an operator designed to yield

⁴⁰If the reader does not want to countenance sets as *logically* complex, we might expand our deflationary-friendly interpretation, such that our deductive rules reflect the nature of explanation from the generically simple to the generically complex. This would remain deflationary-friendly, because the value of such explanation (above other kinds of explanation) is of interest-relative value. We can consider cases where a complex explanation of a simply expressed phenomenon is valuable.

⁴¹My particular thanks to Tim Button for this suggestion.

some object. For example, in the theory of unrestricted mereology, we might have that

- $\Phi(a_1, a_2 \dots)$: $a_1, a_2 \dots$ are each self-identical (the condition is trivial)
- $\text{ABSTRACTION}(a_1, a_2 \dots) = \text{the fusion of } a_1, a_2 \dots$

such that our mathematical principle may be summarised as follows:

For any things, the fusion of those things exists.

Call these mathematical principles *abstraction principles*. The thought is that we offer a *schema* of deductive rules *Abstraction Grounding Schema* to govern the grounding behaviour of abstraction principles:

$$\frac{\Phi(a_1, a_2 \dots)}{\{\Phi(a_1, a_2 \dots)\} < \text{ABSTRACTION}(a_1, a_2 \dots) \text{ exists}}$$

The hope is that this prevents the need for the addition of *many, arbitrary* supplemental rules to get the Ground-Naturalness Connection to work. This limits the undermining of the role for Naturalish translation and addresses our ongoing concern about endless, supplemental rules.

Note that this reasoning does not endorse any *particular* abstraction principle. The point is just that *if* a grounding theorist embraces some abstraction principle, then they should supplement $<$ -derivability with an appropriate instance of the Abstraction Grounding Schema.

15.9 Conclusion

This chapter discusses each paradigmatic case of grounding presented in §15.2. I do not pretend that this list is exhaustive of popular grounding claims, but I hope that they are representative of the wider literature.

For each example schema, I have argued one of the following: (1) that the example schema vindicates the Ground-Naturalness Connection; (2) that the example schema is in doubt; or (3) that something *in the spirit of* the Ground-Naturalness Connection is vindicated by the example schema. When it comes to option (3), I have suggested modification – such as in the case of abstraction grounding claims. These appeals preserve a deflationary-friendly interpretation of grounding.

As noted in §15.1, considering these examples defends the left-to-right direction of the biconditional. In considering these example schemes, I have therefore provided support for something like the Ground-Naturalness Connection being true. I now turn to theoretical applications of grounding.

Chapter 16

Theoretical Applications of Grounding

16.1 Introduction

Grounding has a variety of theoretical roles: characterising fundamentality, intrinsicity, physicalism and the distinction between certain three-dimensionalist and four-dimensionalist positions. This chapter demonstrates that these applications of grounding do not produce any problems for the Ground-Naturalness Connection. The thought is that the truth of the Ground-Naturalness Connection should be at least compatible with these theoretical roles, insofar as those theoretical roles are genuinely successful.

The first point to note is that the Ground-Naturalness Connection does not appeal to any of the notions that grounding is purported to characterise. I appeal to perfectly natural translations and our deductive rules. The notion of perfectly natural translation is analysed in terms of perfect naturalness. Given that grounding is not purported to characterise any of these notions, the Ground-Naturalness Connection is not circular.

As it is, it is not clear that circularity would be problematic. I have proposed the Ground-Naturalness Connection as a true biconditional and not as an *analysis*. If the Ground-Naturalness Connection represented an analysis, then circularity would be vicious – I would be attempting to analyse grounding ultimately in terms of grounding. Conversely, there are many true *biconditionals* that are ‘circular’. For example, consider the triviality that

$$\Delta < \phi \text{ iff } \Delta < \phi.$$

For my purposes, as long as there is good reason to think that the right side of the Ground-Naturalness Connection is deflationary-friendly – that it is a subjective, interest-relative matter when it is $<$ -derivable from the set of natural grounding claims that $\Delta < \phi$ – then the truth of the Ground-Naturalness Connection is enough to prompt a deflationary-friendly interpretation of ground. Though the Ground-Naturalness Connection does not appear to be circular, it would not matter if it was.

On the other hand, the purported theoretical applications of grounding could be problematic if the Ground-Naturalness Connection ruled them out as unsuccessful. It may be that the Ground-Naturalness Connection reflects genuine problems with those theoretical applications. However, we want the Ground-Naturalness Connection to be compatible with successful theoretical applications for grounding. Otherwise, the Ground-Naturalness Connection is in doubt, as it is not compatible with how grounding is used. I therefore turn to considering each application in more detail.

I take each theoretical role in turn. In §16.2, I consider grounding's role in characterising fundamentality. In §16.3, §16.4 and §16.5, I consider characterisations of intrinsicity, physicalism and certain three-dimensionalist positions, respectively. In §16.6, I conclude.

16.2 Characterising Fundamentality

Grounding theorists often claim that ' ϕ ' is fundamental iff ϕ is ungrounded. This is a theoretical role for grounding in characterising fundamentality.

We have seen that the Ground-Naturalness Connection keeps faith with a wide variety of grounding judgements. Consequently, there is no reason to doubt that, if ϕ is ungrounded, then it is not $<$ -derivable from the set of natural grounding claims that

$$\Delta < \phi$$

for any Δ . Hence, the set of ungrounded sentences will be identical with the set of sentences that fail to meet the right-hand-side condition of the Ground-Naturalness Connection. Insofar as the Ground-Naturalness Connection keeps

faith with grounding examples, it will deliver the same set of fundamental facts via the biconditional ‘ $\ulcorner \phi \urcorner$ is fundamental iff ϕ is ungrounded’.

16.3 Characterising Intrinsicity

Another theoretical role for grounding is found in characterisations of intrinsicity. Witmer, Butchard & Trogdon (2005) argue that a property is intrinsic iff it can only be exemplified intrinsically, when

An individual a exemplifies P intrinsically iff (i) P is independent of accompaniment and (ii) for any property X , if x has P in virtue of having X , X is also independent of accompaniment.¹

This proposal is based on the following definitions:

Independent of Accompaniment Definition: A property α is independent of accompaniment iff

1. α can be exemplified by an unaccompanied individual,
2. α can fail to be exemplified by an unaccompanied individual,
3. α can be exemplified by an accompanied individual, and
4. α can fail to be exemplified by an accompanied individual.

Accompanied/Unaccompanied Individuals Definition: An individual a is unaccompanied at a possible world w iff the only individual in w is a ; and accompanied at w otherwise.

Consider this proposal, and whether the Ground-Naturalness Connection keeps faith with this theoretical role. The issue rests on whether the right kind of grounding claims are true – or, more importantly, that the wrong kind of grounding claims are false. For example, consider $\{Qa\} \triangleleft Pa$, when a is some individual, P is (intuitively) an intrinsically had property (and independent of accompaniment), and Q is not independent of accompaniment. If there is a case like this, then it is a counterexample against this application of ground.

¹Similarly, Bader (2013) characterises analyses of intrinsicity as guided by two general principles: that intrinsic properties are had solely in virtue of how a thing is and not in virtue of how it is related to other things, and the instantiation of intrinsic properties is independent to how the rest of the world is.

One such potential counterexample is when a denotes Socrates, P refers to the property of being human and Q refers to the property of being brought into existence by process XYZ , when process XYZ is a microphysical characterisation of Socrates's conception from particular gametes.² The property of being brought into existence by process XYZ is not independent of accompaniment, because it can only be exemplified in worlds containing individuals involved in the process XYZ .³ Meanwhile, the property of being human is intuitively intrinsic, and seems independent of accompaniment. The crucial issue, then, is whether $\{\text{Socrates was brought into existence by process } XYZ\} \triangleleft \text{Socrates is human}$.

I believe that our intuitions regarding whether this is a true grounding claim depends on whether we think 'Socrates was brought into existence by process XYZ ' is more fundamental than 'Socrates is human', and on whether we think Socrates being brought into existence by process XYZ is independently sufficient for Socrates being human. This is largely reflected in our intuitions regarding which sentences are Naturalish translations of 'Socrates is human'. Suppose that we are content to say that

$$\gamma = \text{Socrates was brought into existence by process } XYZ_1 \vee \text{Socrates was brought into existence by process } XYZ_2 \vee \dots$$

is a Naturalish translation of 'Socrates is human'.⁴ Further, suppose we are content to say that 'Socrates was brought into existence by process XYZ_1 ' is a Naturalish translation of itself. It follows that it is \triangleleft -derivable that

$$\{\text{Socrates was brought into existence by process } XYZ_1\} \triangleleft \gamma.$$

²Property XYZ refers to particular gametes to accommodate Kripke's (1980) origin essentialism: the doctrine that individuals essentially have (most of) their actual origins.

³For example, Phaenarete and Sophroniscus. However, even in worlds where process XYZ saw Socrates emerge from a swamp (assuming, contrary to Kripke's (1980) origin essentialism, that there are such worlds), we would need that *swamp* to exist at that world for Socrates to be brought into existence by process XYZ .

⁴Accommodating origin essentialism, each process $XYZ_1, XYZ_2 \dots$ will involve the same, particular gametes and mostly the same process. However, origin essentialism allows for some minor variation in origins. For example, it is not essential to Socrates that he was conceived at *precisely* the time he was actually conceived. Hence, processes $XYZ_1, XYZ_2 \dots$ can be seen as duplicate processes that occur at slightly different times.

By the Ground-Naturalness Connection, it follows that this sentence is a true grounding claim.⁵

I propose that it is plausible that the property of being brought into existence by process XYZ_1 is more natural than the property of being human: this reflects the intuition that 'Socrates was brought into existence by process XYZ ' is more fundamental than 'Socrates is human'. However, the Naturalish translation of a sentence should be cointensive with that sentence: a Naturalish translation γ of 'Socrates is human' must be such that $\Box(\wedge \gamma \leftrightarrow \text{Socrates is human})$. This is problematic, for there is reason to doubt that a disjunct of γ is a sufficient condition for Socrates being human. We may think that we need a further fact along the lines of ' $\forall x(\text{if } x \text{ is brought into existence by process } XYZ, \text{ then } x \text{ is human})$ ' to obtain.

If this further fact is required, it follows that

Socrates was brought into existence by process $XYZ_1 \vee$ Socrates was brought into existence by process $XYZ_2 \vee \dots$

fails to be a Naturalish translation of 'Socrates is human'. If so, then the Ground-Naturalness Connection fails to deliver that $\{\text{Socrates was brought into existence by process } XYZ\} \triangleleft \text{Socrates is human}$. If this further fact is not required, meanwhile, then the Ground-Naturalness Connection delivers that $\{\text{Socrates was brought into existence by process } XYZ\} \triangleleft \text{Socrates is human}$.

My belief is that the further fact is not required, and the example constitutes a counterexample against the theoretical application of grounding to characterising intrinsicality. However, it does not matter for present purposes whether my belief is true. The point is that our intuitions regarding the availability of appropriate Naturalish translations tracks our intuitions regarding grounding. If we think that this example constitutes a counterexample, then this is reflected in the Ground-Naturalness Connection. Moreover, it would mean that the theoretical role for grounding was unsuccessful and there would be nothing for the Ground-Naturalness Connection to keep faith with. Alternatively, if we think that this example fails to constitute a counterexample, then this is

⁵The derivation is as follows. We know that it is \triangleleft -derivable that

(1) $\{\text{Socrates was brought into existence by process } XYZ_1\} \triangleleft \gamma$.

By Natural Grounding, it follows that

(2) $\{\text{Socrates was brought into existence by process } XYZ_1\} \blacktriangleleft \text{Socrates is human}$. Hence, it is trivial that this sentence is \triangleleft -derivable from the set of natural grounding claims. By the Ground-Naturalness Connection, it therefore expresses a true grounding claim.

reflected in the Ground-Naturalness Connection, because the same reasoning would suggest that γ is not a genuine Naturalish translation of ‘Socrates is human’. More generally, there is no reason to think that the Ground-Naturalness Connection will not reflect the theoretical role of grounding in characterising intrinsicity, should that theoretical role be successful.⁶

16.4 Characterising Physicalism

Bliss & Trogon (2016) and Fine (2014) suggest that physicalism is best characterised in terms of grounding. The suggestion is that physicalism is the claim that all mental states are grounded in physical states. This is designed to avoid difficulties with intensional, rather than hyperintensional, characterisations of physicalism, which run the risk of being too coarse-grained.

The Ground-Naturalness Conception is entirely compatible with using grounding to characterise physicalism. Insofar as the physicalist wants to affirm a grounding relation between physical properties and mental properties (speaking ungrammatically), they will be prepared to affirm a *connection* between physical properties and mental properties. Presumably they will also be prepared to say that physical properties are more natural than mental properties – that the physical properties carve more closely at the joints of nature. This opens the door for the requisite Naturalish translations. In §15.3, I outline how my biconditional keeps faith with true grounding claims of the example scheme ‘physical events < mental events’.

The physicalist might object to this characterisation of their position, arguing that they are not committed to any ideas of relative fundamentality or a deeper structure to objective reality. Such a physicalist might note that she is simply committed to a type-identity between physical events and mental events. Perhaps she also wants to say that talk in terms of physical events is explanatorily *more useful* than talk in terms of mental events, but that this does not correspond to any objective structure. Such a physicalist would

⁶Characterisations of intrinsicity in terms of grounding have found alternative challenges. Marshall (2013) offers counterexamples to such accounts. He notes that it is plausible that $\{\text{Obama exists}\} < \{\text{Obama}\} \text{ exists}$. The fact that $\{\text{Obama}\}$ exists therefore holds in virtue of the existence of entities distinct from $\{\text{Obama}\}$, such that $\{\text{Obama}\}$ ’s existence is extrinsic. However, Marshall alleges that the property of existence is intrinsic.

Grounding theorists who want to use grounding to characterise intrinsicity might respond that existence is not a *property* that can be intrinsic *or* extrinsic. However, the full details of this debate needn’t concern us here.

therefore reject the idea that physical properties are more natural than mental properties, due to scepticism of hyperintensional notions. Hence, the required Naturalish translations would not be available. However, this same scepticism would also drive her to reject any characterisation of her position in terms of grounding. Hence, this does not involve the Ground-Naturalness Connection breaking faith with this theoretical role.

It seems to me likely that certain physicalists should characterise their position in terms of grounding, and other physicalists should not characterise their position in terms of grounding, depending on their views about the structure of objective reality. However, the Ground-Naturalness Connection reflects when such a characterisation is appropriate, and when it is not. It is therefore well-suited for this theoretical role.

16.5 Characterising Three-Dimensionalist and Four-Dimensionalist Positions

Fine (2014) suggests that grounding is crucial for understanding the distinction between certain three-dimensionalist and four-dimensionalist positions. He notes that the three-dimensionalist might be willing to admit that material things have temporal parts ‘in thought’, but hold that the existence of a temporal part is grounded in the existence of the persisting object at the relevant time. Without grounding, the distinction between the three-dimensionalist who accepts temporal parts and the four-dimensionalist is impossible to characterise.

The Ground-Naturalness Connection can accommodate this theoretical role, given certain assumptions about future supplementations to our deductive rules, and by eliminating names from Naturalish as detailed in §15.7. Suppose that a is the temporal part of a persisting object b at time t . Suppose that:

- ‘ Ax ’ expresses that x exemplifies the haecceitic property of being a .
- ‘ Bx ’ expresses that x exemplifies the haecceitic property of being b .
- ‘ Tx ’ expresses that x exemplifies the property of occupying time t .

A Naturalish translation of ‘ a exists’ is given by:

$$‘\exists x(Bx \wedge Tx)’$$

This can be roughly read (in English) as ‘persisting object b exists and occupies time t ’.

Meanwhile, a Naturalish translation of ‘ b exists’ is given by ‘ $\exists xBx$ ’.

To accomodate this theoretical role, we need our rules to be supplemented with rules involving existential quantification. In particular, we would need it to be the case that

$$\frac{\exists xFx}{\exists xFx \leq \exists x(Fx \wedge Gx)}$$

For any predicates F and G .

It would follow that

$$\{\text{persisting object } b \text{ exists}\} \trianglelefteq \text{temporal part } a \text{ exists}$$

is a natural grounding claim. By the Ground-Naturalness Connection, we would therefore arrive at the desired (partial) grounding claim.

In my mind, it is plausible that $\{\exists xFx\}$ is a partial ground of $\exists x(Fx \wedge Gx)$. In theory, then, our deductive rules should be supplementable with deductive rules that deliver this result. However, as remarked in §15.7, Korbmacher notes that introducing quantification to the system comes with complicated, infinitary issues. On the other hand, he is optimistic regarding further work into the subject. I am content to share in this optimism.

As such, the idea is that the property of being a particular persisting object is more natural (and thus more fundamental) than the property of being a particular temporal part. If a theorist disagrees with this claim of relative naturalness, then they will reject the Naturalish translations provided and Fine’s grounding claim cannot be derived from the Ground-Naturalness Connection. However, such a theorist is well-motivated to reject Fine’s grounding claim. This is because grounding is meant to track the direction of relative fundamentality, and the theorist denies that particular temporal parts are less fundamental than their corresponding, persisting objects.

The Ground-Naturalness Connection is therefore well-suited for this theoretical role, tracking any intuition regarding the relative fundamentality of temporal parts and persisting objects.

16.6 Conclusion

Consequently, the Ground-Naturalness Connection either keeps faith with the theoretical applications of ground, or there are good reasons to doubt the correctness of those applications.

This completes my defence of the Ground-Naturalness Connection. I have delivered a proof of the biconditional in the right-to-left direction in ch.14. In the same chapter, I have provided a conceptual argument for the left-to-right direction. Additionally, I have provided further arguments that support the truth of the biconditional in the left-to-right direction. In ch.15, I argued that the Ground-Naturalness Connection is vindicated by a wide variety of examples of grounding claims. In this chapter, I have shown that the Ground-Naturalness Connection is compatible with successful applications of grounding.

I therefore propose that something in the spirit of the Ground-Naturalness Connection is true. This delivers a deflationary-friendly interpretation of grounding, insofar as we should adopt a deflationary-friendly interpretation of naturalness.

Chapter 17

Small-g Relations

17.1 Introduction

In this short chapter, I consider an objection against grounding that bears on my strategy against hyperintensional manoeuvres. This objection makes the case for grounding being an unnatural disjunction of ‘small-g’ relations, rather than a unified, metaphysical phenomenon. It does not directly challenge the Ground-Naturalness Connection, but does raise indirect complications for my deflationary methodology. In §17.2, I explain what this objection amounts to, and, in §17.3, I consider how the argument is broadly supportive of my strategy against hyperintensional manoeuvres. In §17.4, I conclude.

17.2 The Small-g Relation Objection

Suppose that we wanted to say that

{My arm exists} \leq I exist,

and that

{Socrates exists} \triangleleft {Socrates} exists.

The ‘small-g’ theorist argues that the first claim is about *parthood* – that my arm is a part of my body – and that the second claim is about *set-membership* – that Socrates is the sole member of {Socrates}. The objection is that these

two relations are entirely distinct, and that it is artificial to group them under *grounding*.

Bennett (2011) defends the (standard) view of grounding as unitary. The thought is that grounding is a fundamental building relation of which other, standard metaphysical notions are species. These species include composition, constitution, realisation of properties, micro-based determination and emergence.¹ One of Bennett's arguments for this conceptual unity is that these species of metaphysical notions all seem to licence the 'in virtue of' locution. Moreover, we use terms such as 'compose', 'realise' and 'emerge' 'in so many mixed up motley ways' (2011, 89) which suggests conceptual entanglements between them.

This view of grounding as unitary is challenged by Koslicki (2014) and Wilson (2014, 2016). They argue that the 'small-g' relations are not species of one notion of grounding as Bennett supposes. Wilson (2014) notes that the small-g relations do not share logical properties. For an example, she proposes that set-membership is a small-g relation, but that it is not transitive. Yet Bennett (2011) argues that this is not conclusive. Though it demonstrates that set-membership is not *identical* with (say) composition, it does not refute the claim that set-membership and composition are both *species* of a broader genus. On the other hand, I propose that the diversity in the logical properties of small-g relations at least *undermines* the idea that they belong to a broader genus. It does not conclusively demonstrate that there is no such genus, but it does provide a point of contrast between the small-g relations that undermines any proposal to unify them.

Koslicki and Wilson bring more arguments to bear against unified grounding. Their arguments can be construed as a response to an indispensability argument in favour of grounding. My reformulation of their arguments is as follows:

1. We should accept grounding as a metaphysical kind only if it is indis-

¹Composition is a many-one relation between distinct objects and conceptually linked with parthood. Constitution is a one-one relation between co-located objects of different kinds. Realisation is a one-one relation between properties, property instances or perhaps states of affairs. Micro-based determination is a many-one relation between properties instantiated by different individuals, of which the micro-based properties are 'nothing over and above' the properties in which they are based. Emergence is micro-based determination without the thought that the micro-based properties are nothing over and above the properties in which they are based.

pensable.

2. Grounding is dispensable.
3. Hence, we should not accept grounding as a metaphysical kind.

Premise 1 can be defended on the basis of ideological conservatism, or perhaps by suspicion of metaphysical kinds. The thought is that positing metaphysical kinds incurs some kind of cost, that should be overcome by their theoretical roles.

Koslicki and Wilson focus on premise 2. They both note that grounding does little theoretical work when we already have the small-g relations to hand. To defend this contention, Wilson (2014) considers physicalism. She notes that there are various ways of being a physicalist, and that grounding is too coarse-grained to distinguish those positions. For example, physicalist *A* may think that the mental reduces to the physical, and so claim that the mental is grounded in the physical. Another physicalist *B* may reject the thought that the mental reduces to the physical, but insist that the mental is, in some sense, *composed* out of the physical. Hence *B* will also assert that the mental is grounded in the physical. Consequently, *A* and *B* both agree on the grounding claim whilst substantively disagreeing about physicalism. This suggests that grounding is too coarse-grained to be of much use in describing the disputes regarding physicalism.

A response to Wilson might be that grounding-talk is still useful in characterising physicalism, even if there is disagreement within the physicalist camp. By analogy, the concept of moral realism is a useful idea, even though the deontologist and consequentialist have substantive disagreement within the camp of moral realism. However, Wilson should respond that this fails to defend grounding *as a metaphysical kind*. Though grounding-talk may be useful, this does not mean that there is a metaphysical kind corresponding to that talk. We find an analogy in the case of jade. Plausibly, jade is not a natural kind, because it is improperly disjunctive: both jadeite and nephrite are called ‘jade’, and the two substances have entirely distinct chemical compositions. Nonetheless, we can see how jade-talk might be useful in bartering and trade. The *pragmatic* benefits of jade-talk is not sufficient for jade to be a natural kind. Analogously, the pragmatic benefits of grounding-talk is not sufficient for grounding to be a metaphysical kind.

There are other reasons to think that grounding is dispensable. Wilson (2014) adds that we do not need grounding to talk about metaphysical dependence, because small-g relations such as type identity, token-but-not-type identity, functional realisation, the part-whole relation, the set membership relation and so on are already available to describe individual instances of metaphysical dependence. Indeed, heeding the argument above, grounding seems too coarse-grained to describe the varieties of metaphysical dependence that we seem to find in the world.

An available response to these arguments is to note that we need grounding to govern the *direction* of metaphysical dependence. The part-whole relation does not come ‘ready made’ with a direction of metaphysical dependence – nothing about the fact that my right hand is a part of my body (directly) implies that $\{\text{my right hand exists}\} \leq \text{my body exists}$. The thought is that a distinct relation of ground provides these facts about the direction of metaphysical dependence. However, Wilson (2016) responds that this work can be done by a distinct relation of primitive fundamentality. Wilson rejects analyses of fundamentality in terms of grounding because it rules out the possibility of fundamental facts being self-grounded or mutually-grounded.

17.3 Small-g Relation Objections and the Ground-Naturalness Connection

My interest in the argument against unified ground concerns what it means for analyses of fundamentality in terms of ground.

Koslicki and Wilson argue that grounding is not unified. Meanwhile, if grounding is not unified then it should not be posited as a distinct, metaphysical kind. This provides another reason to favour the deflationary-friendly interpretation of grounding provided by the Ground-Naturalness Connection. Deflationary-friendly grounding is not supposed to be a metaphysical kind: it is a subjective, interest-relative phenomenon. By contrast, deflationary-unfriendly grounding is posited as a metaphysical kind. Hence, if Koslicki and Wilson’s arguments show that grounding is not a metaphysical kind, so much the better for deflationary-friendly interpretations of ground.

Koslicki and Wilson’s arguments also undermine the role that grounding can play in *hyperintensional manoeuvres*. It seems that the small-g relations are in-

dividually insufficient to characterise fundamentality. By Wilson's own lights, small-g relations alone do not provide the direction of metaphysical dependence or relative fundamentality. This is why Wilson is tempted to posit primitive fundamentality. If Wilson is correct, then we cannot use hyperintensional manoeuvres through fundamentality as characterised by (any interpretation of) ground. This is because neither deflationary-friendly or unfriendly ground can be used to analyse fundamentality.

Accepting the disunity of ground therefore affects my thesis in both positive and negative ways. Positively, it supports deflationary-friendly interpretations of ground. Furthermore, it blocks the attempt to use hyperintensionalist manoeuvres through fundamentality as characterised by ground. This is because – if Wilson and Koslicki are correct – there *is no effective characterisation of fundamentality in terms of ground*. Negatively, Wilson leaves us with primitive fundamentality, which *can* be utilised for hyperintensionalist manoeuvres. To block such a manoeuvre, I would need to give a deflationary-friendly interpretation of primitive fundamentality. This would be difficult to do without first knowing more about what primitive fundamentality amounts to – examples of its use, theoretical roles and so on. I do not attempt this project in this thesis.

Instead of appealing to primitive fundamentality, perhaps Wilson (2014, 2016) could appeal to primitive naturalness. If naturalness can be used to characterise fundamentality, then the direction of metaphysical dependence can be provided by naturalness instead of ground. This would suit my purposes directly, as Part 2 provides a deflationary-friendly interpretation of naturalness that would 'push through' to this characterisation of fundamentality. Appealing to deflationary-friendly naturalness would also allow Wilson to eliminate another highly metaphysical, primitive notion.

The small-g relation objection is therefore mostly supportive of my deflationary project.

17.4 Conclusion

In this chapter, I have considered an alternative challenge to grounding-variants of hyperintensional manoeuvre. This small-g relation objection argues that grounding cannot be used to characterise fundamentality. It follows that there are no grounding-variants of hyperintensional manoeuvre. Further, it suggests

that grounding is not a metaphysical kind, supporting deflationary-friendly interpretations. However, the objection is not entirely deflationary-friendly, because Wilson seeks to replace primitive grounding with primitive fundamentality. On the other hand, this deflationary-unfriendliness can be eliminated by appealing to primitive naturalness instead of primitive fundamentality.

A more complete thesis would consider primitive fundamentality and whether it admits of a deflationary-friendly interpretation. This would defend deflationary heuristics from primitive fundamentality-variants of hyperintensional manoeuvre.

However, I propose that I am warranted to wait until the notion of primitive fundamentality is developed. To provide support for the Ground-Naturalness Connection, I considered paradigmatic examples of grounding claims, theoretical links between grounding and other primitive notions, and the theoretical roles to which grounding is applied. Without this kind of information available about primitive fundamentality, it is hard to see how a deflationary-friendly interpretation could be defended. However, this is not to say that the correct interpretation of primitive fundamentality is not deflationary-friendly. Instead, the point is that the notion of primitive fundamentality needs to be developed if it is to do serious, metaphysical work. Once this work has begun, I will be in a position to assess whether the correct interpretation of primitive fundamentality is deflationary-friendly. The ball is in the substantivist's court.

Chapter 18

Conclusion

I am now in a position to conclude my thesis.

The structure of my argument has been as follows. I have detailed deflationary heuristics designed to argue that certain disputes are deflatable and should be deflated. These deflationary heuristics are susceptible to what I have called *hyperintensional manoeuvres*. These manoeuvres reformulate the dispute as disputes about hyperintensional facts, such that one property or position is more *fundamental*. Having set up this threat, the rest of this thesis has mounted a defence on behalf of the deflationist against hyperintensional manoeuvres.

The thought is that we can defang hyperintensional manoeuvres if it is a subjective, interest-relative matter whether a property or fact is more fundamental. If this is the case, then it is only of pragmatic significance whether one side in a dispute uses more fundamental concepts. By reformulating metaphysical disputes about disputes over fundamentality, hyperintensional manoeuvres succeed only in reformulating the dispute into a pragmatic dispute. This fails to preserve the substantive metaphysics that is otherwise deflated.

To demonstrate that fundamentality is subjective and interest-relative, I noted that there are various analyses available of fundamentality. Some seek to analyse fundamentality in terms of naturalness, others in terms of grounding. To render each variant of fundamentality subjective and interest-relative – or *deflationary-friendly* – I had to show that the correct interpretations of naturalness and grounding are deflationary-friendly.

I started with naturalness in Part 2. I presented my Deflationary-Friendly

Naturalness, which interpreted naturalness such that

Deflationary-Friendly Naturalness: Property α is *perfectly natural* iff α is a property referred to by a primitive predicate in the language of ideal science.

I explained what I meant by ‘ideal science’ and showed that Deflationary-Friendly Naturalness rendered naturalness subjective and interest-relative. To demonstrate that it is the *correct* interpretation of naturalness, I appealed to the following cost-benefit analysis. The thought was that, if my interpretation of naturalness can enjoy the same theoretical benefits as its rivals, but more cheaply, then it should be favoured as the correct interpretation. Having shown that Deflationary-Friendly Naturalness avoided costs associated with its rivals, I turned to demonstrating that it can enjoy the same theoretical benefits. I showed that many of the theoretical applications of naturalness are compatible with Deflationary-Friendly Naturalness. Though Deflationary-Friendly Naturalness is incompatible with some of the traditional roles given to naturalness, I argued that these theoretical applications are unsuccessful on any interpretation. Hence, I demonstrated that Deflationary-Friendly Naturalness enjoys the same theoretical benefits as its rivals, but with fewer costs. A plausible cost-benefit analysis therefore favours my deflationary-friendly interpretation as correct. This defangs naturalness-variants of hyperintensional manoeuvre.

In Part 3, I turned to metaphysical grounding. I argued for conceptual links between grounding and naturalness, such that the deflationary-friendly interpretation of naturalness would push through the conceptual link and show grounding to be deflationary-friendly. I argued that

Ground-Naturalness Connection: $\Delta \triangleleft \phi$ iff there is a $<$ -derivation from the set of natural grounding claims to ‘ $\Delta \triangleleft \phi$ ’.

such that

Natural Grounding Definition: $\Delta \blacktriangleleft \phi$ iff there is a $<$ -derivation of ‘ $\Lambda < \gamma$ ’, when Λ is a set of perfectly natural translations of the sentences in Δ , and γ is some perfectly natural translation of ϕ .

Having explained what the Ground-Naturalness Connection amounts to, I turned to defending the biconditional. I made arguments for conceptual links

between grounding, perfectly natural translation and our deductive rules. I considered a range of paradigmatic examples of grounding, and showed that they helped vindicate the Ground-Naturalness Connection. Finally, I argued that the Ground-Naturalness Connection is compatible with those theoretical applications of grounding that are successful. These points of evidence support the claim that the Ground-Naturalness Connection is true – that the left-hand-side of the biconditional obtains iff the right-hand-side obtains. This showed grounding to be deflationary-friendly. This defangs grounding-variants of hyperintensional manoeuvre.

Here, then, I conclude. I have defended deflationary heuristics from variants of hyperintensional manoeuvre. My arguments have conceded much to the substantivist – such as the meaningfulness of their notions, and the theoretical benefits that they can bring. I propose that my arguments are stronger for these concessions. The substantivist cannot complain that my arguments simply dismiss the substantivist’s project: these arguments can be countenanced not only by critics of substantivism, but by substantivists as well.

If the substantivist is to argue against the application of deflationary heuristics, they need to offer alternative analyses of fundamentality, and thus alternative variants of hyperintensional manoeuvre. For example, the substantivist might appeal to Sider’s (2011) notion of structure, or Wilson’s (2014) notion of primitive fundamentality. This gestures in the direction of future work for protecting the deflationist against hyperintensional manoeuvres. For instance, I propose that we may be able to offer a deflationary-friendly interpretation of Sider’s structure, and that this interpretation may be favoured by a plausible cost-benefit analysis. I leave this work for a future project. Here, I am content to show that naturalness and grounding-variants of hyperintensional manoeuvre cannot be utilised against the deflationist, as the substantivist intends.

Bibliography

- [1] Audi, Paul 2012. Grounding: Toward a Theory of the in-Virtue-of Relation. In: *The Journal of Philosophy* CIX (12)
- [2] Audi, Paul 2014. A Clarification and Defence of the Notion of Grounding. In: F. Correia & B. Schnieder, ed., *Grounding and Explanation*. Cambridge: Cambridge University Press.
- [3] Bader, Ralf M. 2013. Towards a Hyperintensional Theory of Intrinsicity. In: *Journal of Philosophy* 110 (10): 525-563.
- [4] Biggs, Stephen & Wilson, Jessica 2016. Carnap, the Necessary a Posteriori and Metaphysical Anti-Realism. In: S. Blatti & S. Lapointe, ed., *Ontology after Carnap*. Oxford: Oxford University Press.
- [5] Button, Tim 2013. *The Limits of Realism*. Oxford: Oxford University Press.
- [6] Button, Tim 2016. Review of: *Ontology after Carnap*, by Stephan Blatti and Sandra Lapointe (eds.). In: *Notre Dame Philosophical Reviews*
- [7] Button, Tim unpublished. A dogma of metaphysics. Unpublished manuscript.
- [8] Bennett, Karen 2009. Composition, Colocation, and Metaontology. In: D. J. Chalmers, D. Manley & R. Wasserman, ed., *Metametaphysics*. Oxford: Clarendon Press.
- [9] Bennett, Karen 2011. Construction area (no hard hat required). In: *Philosophical Studies* 154: 79-104.
- [10] Bliss, Ricki & Trogon, Kelly 2016. Metaphysical Grounding. In: E. N. Zalta, ed., *The Stanford Encyclopedia of Philosophy*. URL = <https://plato.stanford.edu/archives/win2016/entries/grounding/>

- [11] Burge, T. 1979. Individualism and the Mental. In: P. A. French, T. E. Uehling & H. K. Uehling, ed., *Midwest Studies in Philosophy IV*. Minneapolis, MN: University of Minnesota Press: 73-121
- [12] Carnap, Rudolph 1950. Empiricism, Semantics, and Ontology. Reprinted in: *Meaning and Necessity*, Second edition. Chicago: University of Chicago Press.
- [13] Chakravartty, Anjan 2017. Scientific Realism. In: E. N. Zalta, ed., *The Stanford Encyclopedia of Philosophy*. URL = <<https://plato.stanford.edu/archives/sum2017/entries/scientific-realism/>>.
- [14] Chalmers, David J. 2009. Ontological Anti-Realism. In: D. J. Chalmers, D. Manley & R. Wasserman, ed., *Metametaphysics*. Oxford: Clarendon Press.
- [15] Chalmers, David J. 2011. Verbal Disputes. In: *Philosophical Review* 120 (4): 515-566.
- [16] Clark, Michael J. & Liggins, David 2012. Recent work on grounding. In: *Analysis*.
- [17] Collins, Harry & Pinch, Trevor 1993. *The Golem: What Everyone should know about Science*. Cambridge: Cambridge University Press.
- [18] Correia, Fabrice 2016. An Impure Logic of Representational Grounding. In: *Journal of Philosophical Logic*.
- [19] Creath, Richard 2016. Carnap and Ontology: Foreign Travel and Domestic Understanding. In: S. Blatti & S. Lapointe, ed., *Ontology after Carnap*. Oxford: Oxford University Press.
- [20] Daly, Chris 2012. Scepticism about grounding. In: F. Correia & B. Schnieder, ed., *Metaphysical Grounding: Understanding the Structure of Reality*. Cambridge: Cambridge University Press.
- [21] DeRosset, Louis 2013. Grounding Explanations. In: *Philosophers' Imprint* 13 (7).
- [22] Dixon, T. Scott 2016. What is the Well-Foundedness of Grounding? In: *Mind* 125: 439-468.

- [23] Duhem, Pierre Maurice Marie [1906] 1954. In: P. P. Wiener, tr., *The Aim and Structure of Physical Theory*. Princeton: Princeton University Press.
- [24] Eddon, M. & Meacham, C. J. G. 2015. No Work for a Theory of Universals. URL = <http://people.umass.edu/mayae/NW.pdf>.
- [25] Eklund, Matti 2016. Carnap's Legacy for the Contemporary Metaontological Debate. In: S. Blatti & S. Lapointe, ed., *Ontology after Carnap*. Oxford: Oxford University Press.
- [26] Evans, Gareth 1973. The Causal Theory of Names. In: *Proceedings of the Aristotelian Society Suppl. Vol. 47*: 187-208
- [27] Evnine, Simon 2016. Much Ado about Something-from-Nothing; or, Problems for Ontological Minimalism. In: S. Blatti & S. Lapointe, ed., *Ontology after Carnap*. Oxford: Oxford University Press.
- [28] Feyerabend, Paul 1975. *Against Method*. The Thetford Press Ltd.
- [29] Fine, Kit 2012. The Pure Logic of Ground. In: *Review of Symbolic Logic* 5 (1): 1-25.
- [30] Fine, Kit 2014. Guide to ground. In: F. Correia & B. Schnieder, ed., *Metaphysical Grounding: Understanding the Structure of Reality*. Cambridge: Cambridge University Press.
- [31] Glen, Stephanie 2017. Multiset, Multiplicity and Multichoose: Simple Definition & Examples. URL = <http://www.statisticshowto.com/multiset/>
- [32] Goodman, Nelson 1955. *Fact, Fiction & Forecast*. Cambridge, MA: Harvard University Press.
- [33] Grice, H. P. & Strawson, P. F. 1956. In defense of a dogma. In: *Philosophical Review* 65 (2): 141-158.
- [34] Guigon, Ghislain 2014. Overall similarity, natural properties, and paraphrases'. In: *Philosophical Studies* 167: 387-399.
- [35] Hacking, Ian 2007. The contingencies of ambiguity. In: *Analysis* 67 (4).

- [36] Hale, Bob & Wright, Crispin 2009. The Metaontology of Abstraction. In: D. J. Chalmers, D. Manley & R. Wasserman, ed., *Metametaphysics*. Oxford: Clarendon Press.
- [37] Hirsch, Eli 2005. Physical-object ontology verbal disputes, and common sense. In: *Philosophy and Phenomenological Research* 70: 67-98
- [38] Hirsch, Eli 2009. Ontology and Alternative Languages. In: D. J. Chalmers, D. Manley & R. Wasserman, ed., *Metametaphysics* Oxford: Clarendon Press.
- [39] Hirsch, Eli 2016. Three Degrees of Carnapian Tolerance. In: S. Blatti & S. Lapointe, ed., *Ontology after Carnap*. Oxford: Oxford University Press.
- [40] Hofweber, Thomas 2009. Ambitious, Yet Modest, Metaphysics. In: D. J. Chalmers, D. Manley & R. Wasserman, ed., *Metametaphysics*. Oxford: Clarendon Press.
- [41] Hofweber, Thomas 2016. Carnap's Big Idea. In: S. Blatti & S. Lapointe, ed., *Ontology after Carnap*. Oxford: Oxford University Press.
- [42] Jenkins, Carrie 2011. Is Metaphysical Dependence Irreflexive? In: *The Monist* 94 (2): 267-76.
- [43] Jenkins, C. S. I. 2014. Merely Verbal Disputes. In: *Erkenn* 79: 11.
- [44] Korbmacher, Johannes 2016. Properties Grounded in Identity: A Study of Essential Properties.
- [45] Koslicki, Kathrin 2014. The coarse-grainedness of grounding. In: *Oxford Studies in Metaphysics*: 306-344.
- [46] Krämer, Stephan 2013. A Simpler Puzzle of Ground. In: *Thought: A Journal of Philosophy* 2 (2)
- [47] Kripke, Saul 1980. *Naming and Necessity*. Oxford: Blackwell.
- [48] Kripke, Saul 1982. *Wittgenstein on Rules and Private Language*. Harvard: Harvard University Press.
- [49] Kuhn, Thomas S. 1970. *The Structure of Scientific Revolutions* Second Edition. Chicago: The University of Chicago Press.

- [50] Lange, Marc 2013. Grounding, scientific explanation, and Humean laws. In: *Philosophical Studies* 164 (1): 255-261
- [51] Laudan, Larry 1981. A Confutation of Convergent Realism. In: *Philosophy of Science* 51 (1): 156-162
- [52] Lavers, Gregory 2016. Carnap on Abstract and Theoretical Entities. In: S. Blatti & S. Lapointe, ed., *Ontology after Carnap*. Oxford: Oxford University Press.
- [53] Leuenberger, Stephan 2013. From Grounding to Supervenience? In: *Erkenn* 79: 227-240.
- [54] Lewis, David 1975. Language and languages. In: *Minnesota Studies in the Philosophy of Science* VII. University of Minnesota Press.
- [55] Lewis, David 1982. Logic for Equivocators. In: *Noûs* 16: 431-441.
- [56] Lewis, David 1983. Counterparts of persons and their bodies. In: *Philosophical Papers, Volume I*. Oxford: Oxford University Press: 47-54.
- [57] Lewis, David 1983. New Work for a theory of universals. In: *Australasian Journal of Philosophy* 61 (4).
- [58] Lewis, David 1984. Putnam's Paradox. In: *Australasian Journal of Philosophy* 62 (3): 221-236.
- [59] Lewis, David. 1994. Humean Supervenience Debugged. In: *Mind*, New Series 103 (412): 473-90.
- [60] Loewer, Barry 2007. Laws and Natural Properties. In: *Philosophical Topics* 35 (1/2): 313-328.
- [61] Lowe, E. J. 1998. *The Possibility of Metaphysics*. Oxford: Oxford University Press.
- [62] Marshall, Dan 2013. Intrinsicity and Grounding. In: *Philosophy and Phenomenological Research*
- [63] Merino-Rajme, Carla 2015. Why Lewis's appeal to natural properties fails to Kripke's rule-following paradox. In: *Philosophical Studies* 172: 163-175.

- [64] Nolan, D. 2005. *David Lewis*. Bucks: Acumen.
- [65] Noonan, Harold W. 1989. *Personal Identity*. Oxon: Routledge.
- [66] Oliver, Alex 1996. The Metaphysics of Properties. In: *Mind* 105. Oxford: Oxford University Press.
- [67] Olson, E. 1997. *The Human Animal: Personal Identity Without Psychology*. New York: Oxford University Press.
- [68] Paseau, Alexander 2009. Defining Ultimate Ontological Basis and the Fundamental Layer. In: *The Philosophical Quarterly* 60 (238).
- [69] Popper, Karl 1959. *The Logic of Scientific Discovery*. Hutchinson & Co.
- [70] Price, Huw 2009. Metaphysics after Carnap: The Ghost Who Walks? In: D. J. Chalmers, D. Manley & R. Wasserman, ed., *Metametaphysics*. Oxford: Clarendon Press.
- [71] Prior, Arthur 1967. The runabout inference ticket. In: P. Strawson, ed., *Analysis*. Oxford: Oxford University Press: 38-39.
- [72] Putnam, Hilary 1975. The meaning of 'meaning'. In: *Minnesota Studies in the Philosophy of Science* 7: 131-193
- [73] Putnam, Hilary 1981. *Reason, Truth, and History*. Cambridge: Cambridge University Press.
- [74] Putnam, Hilary 1984. Is the Causal Structure of the Physical Itself Something Physical? In: *Midwest Studies in Philosophy* IX.
- [75] Quine, Willard V. O. 1948. On What There Is. In: *The Review of Metaphysics* 2 (5): 21-38.
- [76] Quine, Willard V. O. 1951. Two Dogmas of Empiricism. In: *Philosophical Review* 60 (1): 20-43.
- [77] Rodriguez-Pereyra, Gonzalo 2015. Grounding is not a strict order. In: *Journal of the American Philosophical Association* 1 (3): 517-534
- [78] Rosen, Gideon 2010. Metaphysical Dependence: Grounding and Reduction. In: B. Hale & A. Hoffman, ed., *Modality: Metaphysics, Logic, and Epistemology*. Oxford: Oxford University Press.

- [79] Schaffer, Jonathan 2009 (a). On What Grounds What. In: D. J. Chalmers, D. Manley & R. Wasserman, ed., *Metametaphysics*. Oxford: Clarendon Press.
- [80] Schaffer, Jonathan 2009 (b). The Deflationary Metaontology of Thomasson's *Ordinary Objects*. In: *Philosophical Books* 50 (3): 142-157.
- [81] Schaffer, Jonathan 2010. Monism: The Priority of the Whole. In: *Philosophical Review* 119 (1). Duke University Press.
- [82] Schaffer, Jonathan 2016. Grounding in the image of causation. In: *Philosophical Studies* 173 (1): 49-100.
- [83] Shoemaker, S. 1980. Causality and Properties. In: P. van Inwagen, ed., *Time and Cause*. Dordrecht: D. Reidel Publishing Company.
- [84] Sidelle, Alan 2016. Frameworks and Deflation. In: S. Blatti & S. Lapointe, ed., *Ontology after Carnap*. Oxford: Oxford University Press.
- [85] Sider, Theodore 2009. Ontological Realism. In: D. J. Chalmers, D. Manley & R. Wasserman, ed., *Metametaphysics*. Oxford: Clarendon Press.
- [86] Sider, Theodore 2011. *Writing the Book of the World*. Oxford: Oxford University Press.
- [87] Taylor, Barry 1993. On Natural Properties in Metaphysics. In: *Mind* 102 (405): 81-100.
- [88] Thomasson, Amie 2007. *Ordinary Objects*. Oxford: Oxford University Press.
- [89] Thomasson, Amie 2009. Answerable and Unanswerable Questions. In: D. J. Chalmers, D. Manley & R. Wasserman, ed., *Metametaphysics*. Oxford: Clarendon Press.
- [90] Thomasson, Amie 2015. *Ontology Made Easy*. OUP.
- [91] Thomasson, Amie 2016. Carnap and the Prospects for Easy Ontology. In: S. Blatti & S. Lapointe, ed., *Ontology after Carnap*. Oxford: Oxford University Press.

- [92] Trogon, Kelly 2013. Grounding: Necessary or Contingent? In: *Pacific Philosophical Quarterly* 94 (4)
- [93] Van Fraassen, Bas C. 1989. *Laws and Symmetry*. Oxford: Oxford University Press.
- [94] Van Inwagen, Peter. 1983. *An Essay on Free Will*. Oxford: Oxford University Press.
- [95] Van Inwagen, Peter 1990. *Material Beings*. Ithaca: Cornell University Press.
- [96] Van Inwagen, Peter 1994. Composition as Identity. In: *Philosophical Perspectives* 8: 207-220
- [97] Van Inwagen, Peter 2001. Materialism and the psychological-continuity account of personal identity. In: *Ontology, Identity, and Modality*. Cambridge: Cambridge University Press.
- [98] Van Inwagen, Peter 2009. Being, Existence, and Ontological Commitment. In: D. J. Chalmers, D. Manley & R. Wasserman, ed., *Metametaphysics*. Oxford: Clarendon Press.
- [99] Williams, J. R. G. 2007. Eligibility and Inscrutability. In: *Philosophical Review* 116 (3): 361-399.
- [100] Williams, J. R. G. 2011. Lewis on Reference and Eligibility. URL = <http://www.personal.leeds.ac.uk/~phljrgw/wip/LewisOnReferenceForCompanion2.pdf>
- [101] Williamson, T. 2008. *The Philosophy of Philosophy*. Oxford: Blackwell.
- [102] Wilson, Alistair 2016. Grounding Entails Counterpossible Non-Triviality. In: *Philosophical and Phenomenological Research* 96 (3)
- [103] Wilson, Jessica M. 2014. No Work for a Theory of Grounding. In: *Inquiry: An Interdisciplinary Journal of Philosophy* 57: 535-579.
- [104] Wilson, Jessica 2016. The Unity and Priority Arguments for Grounding. In: K. Aizawa & C. Gillett, ed., *Scientific Composition and Metaphysical Ground*. Palgrave MacMillan.

- [105] Witmer, D. Gene, Butchard, William & Trogon, Kelly 2005. Intrinsicity without Naturalness. In: *Philosophy and Phenomenological Research* LXX (2).
- [106] Woodward, James 2014. Simplicity in the Best Systems Account of Laws of Nature. In: *Brit. J. Phil. Sci.* 65: 91-123